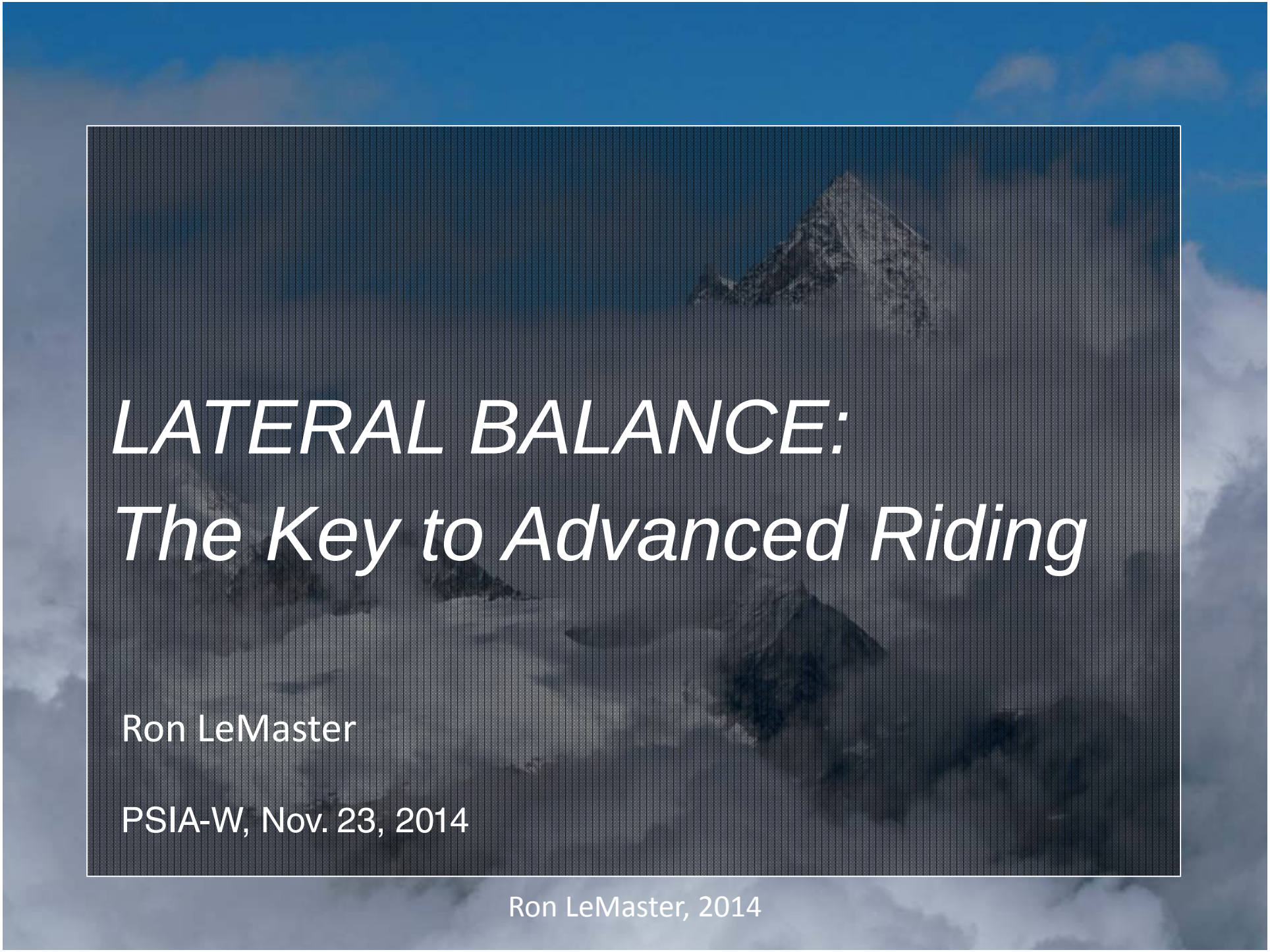


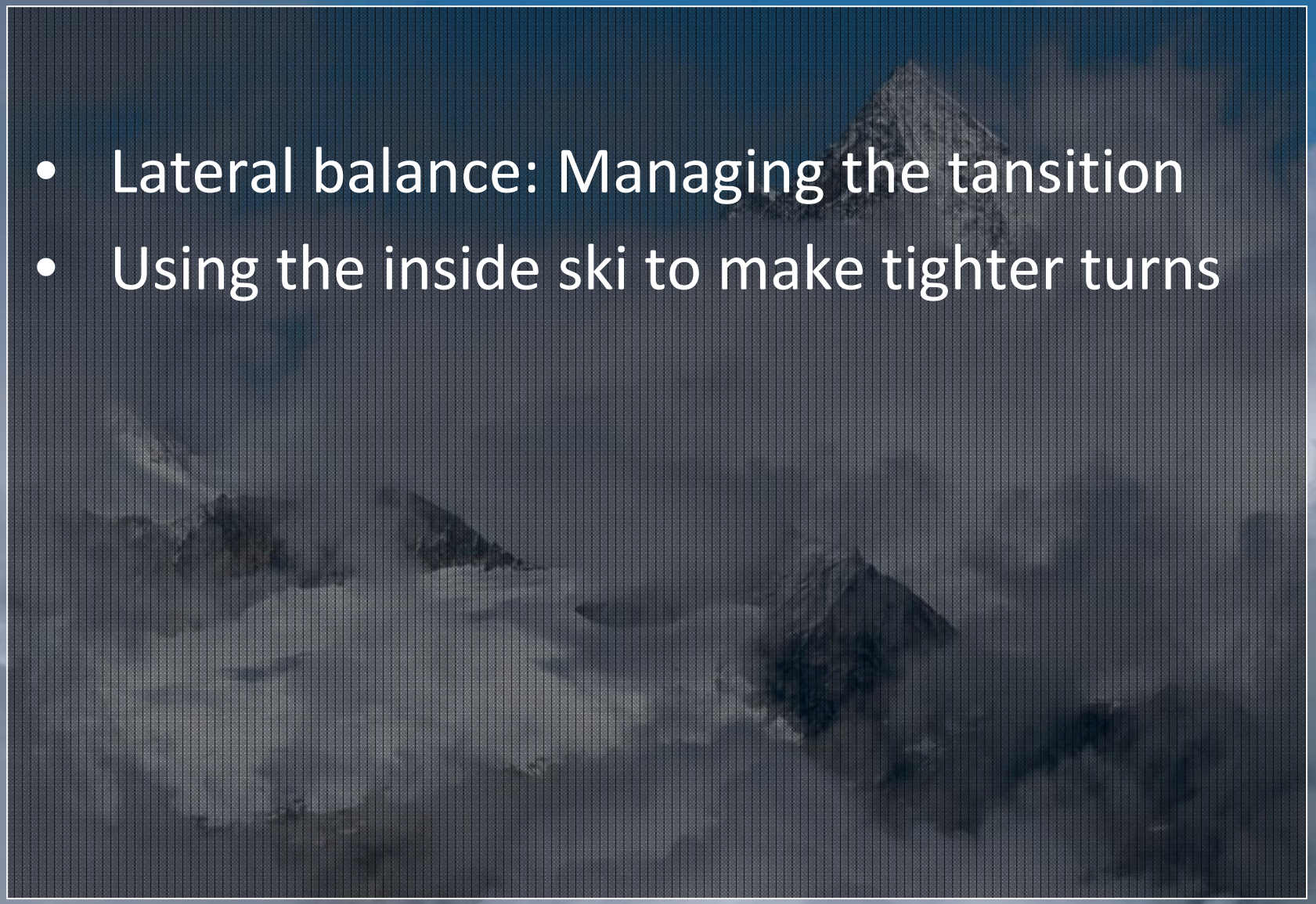
LATERAL BALANCE: The Key to Advanced Riding

Ron LeMaster

PSIA-W, Nov. 23, 2014

Topics

- Lateral balance: Managing the tansition
- Using the inside ski to make tighter turns



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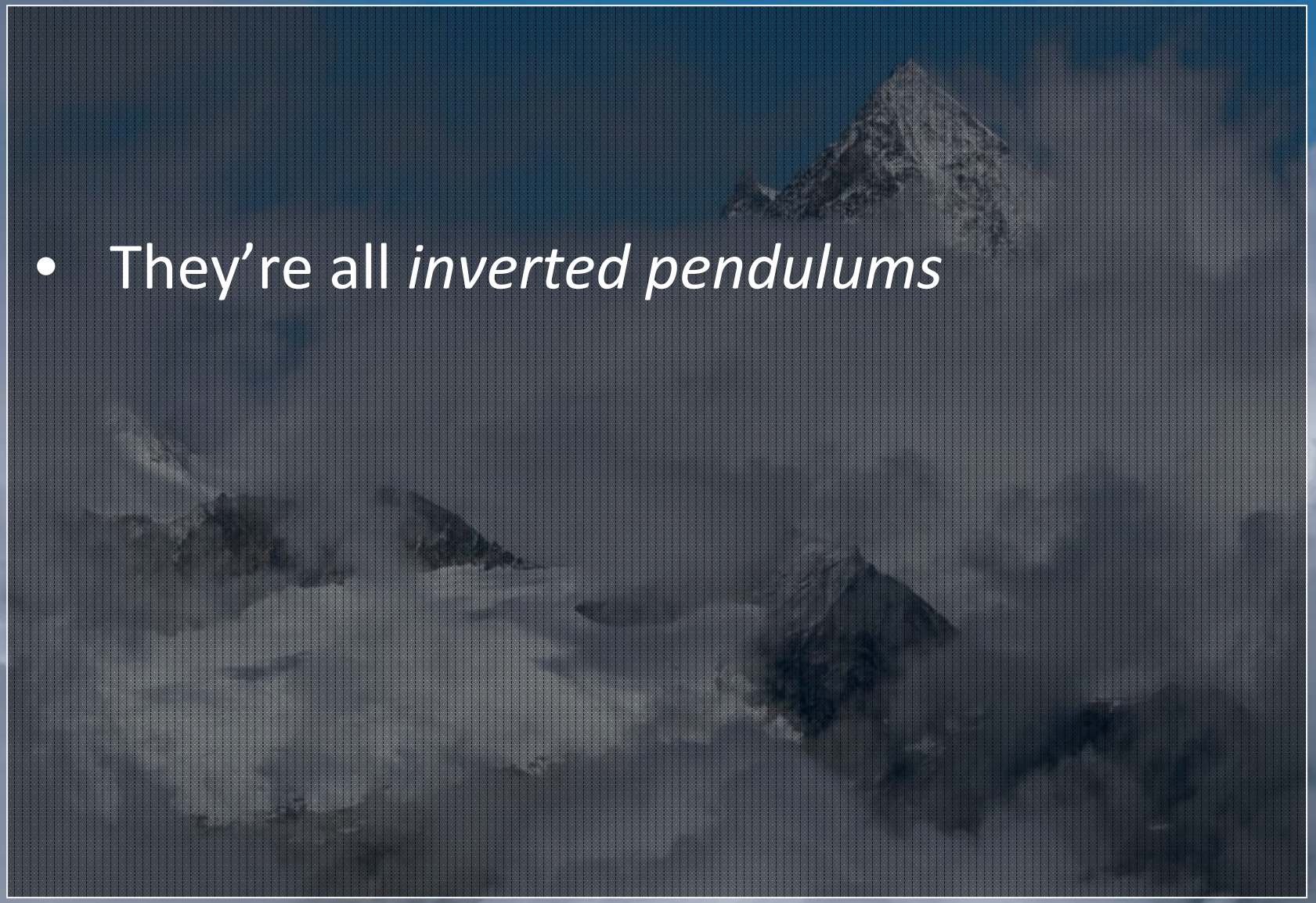
"Riding" Sports

- Skiing, alpine and tele
- Snowboarding
- Surfing
- Skateboarding
- Etc.

What They Have in Common

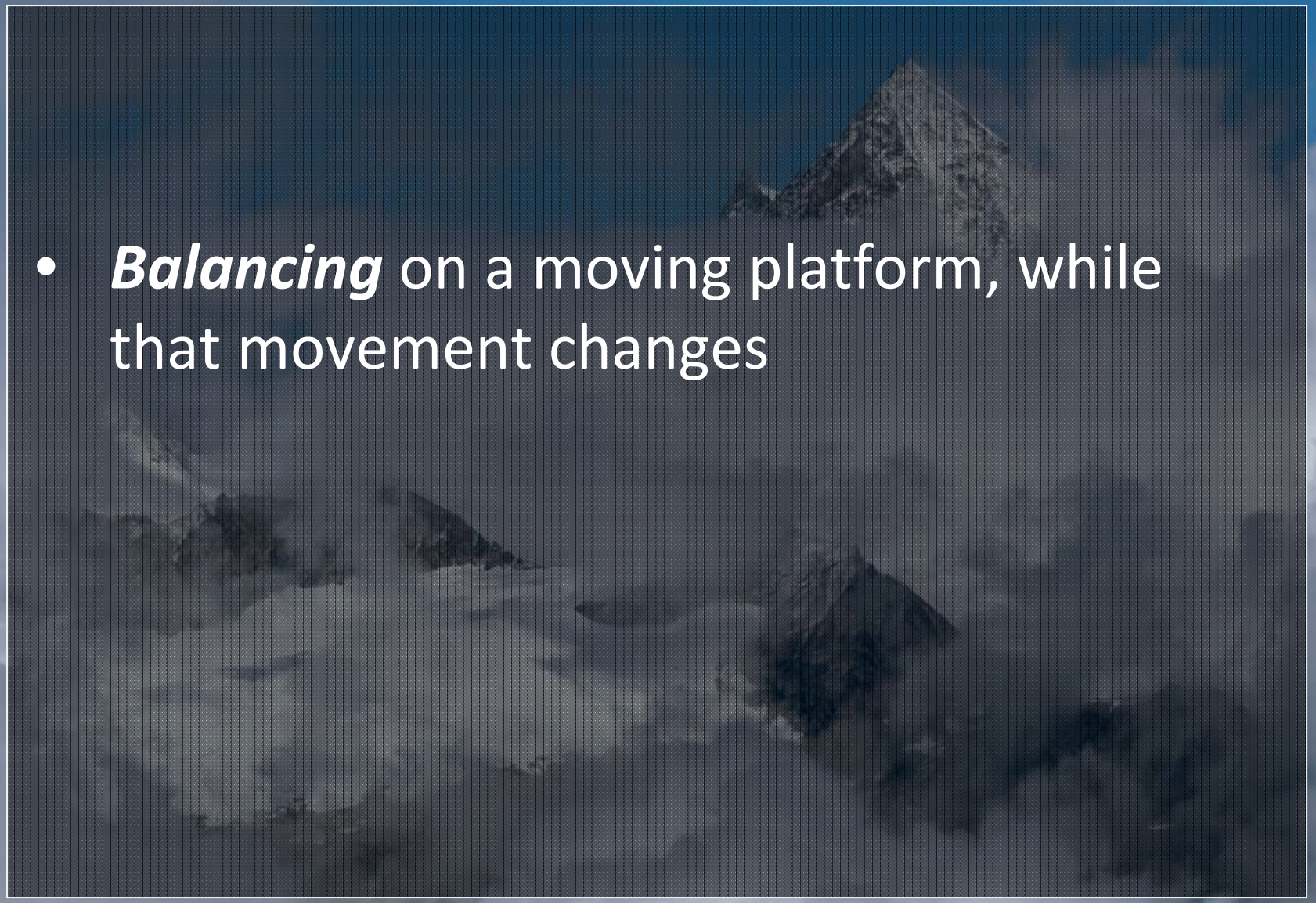
- Balancing on a moving platform whose motion is always changing

Mechanically Speaking…



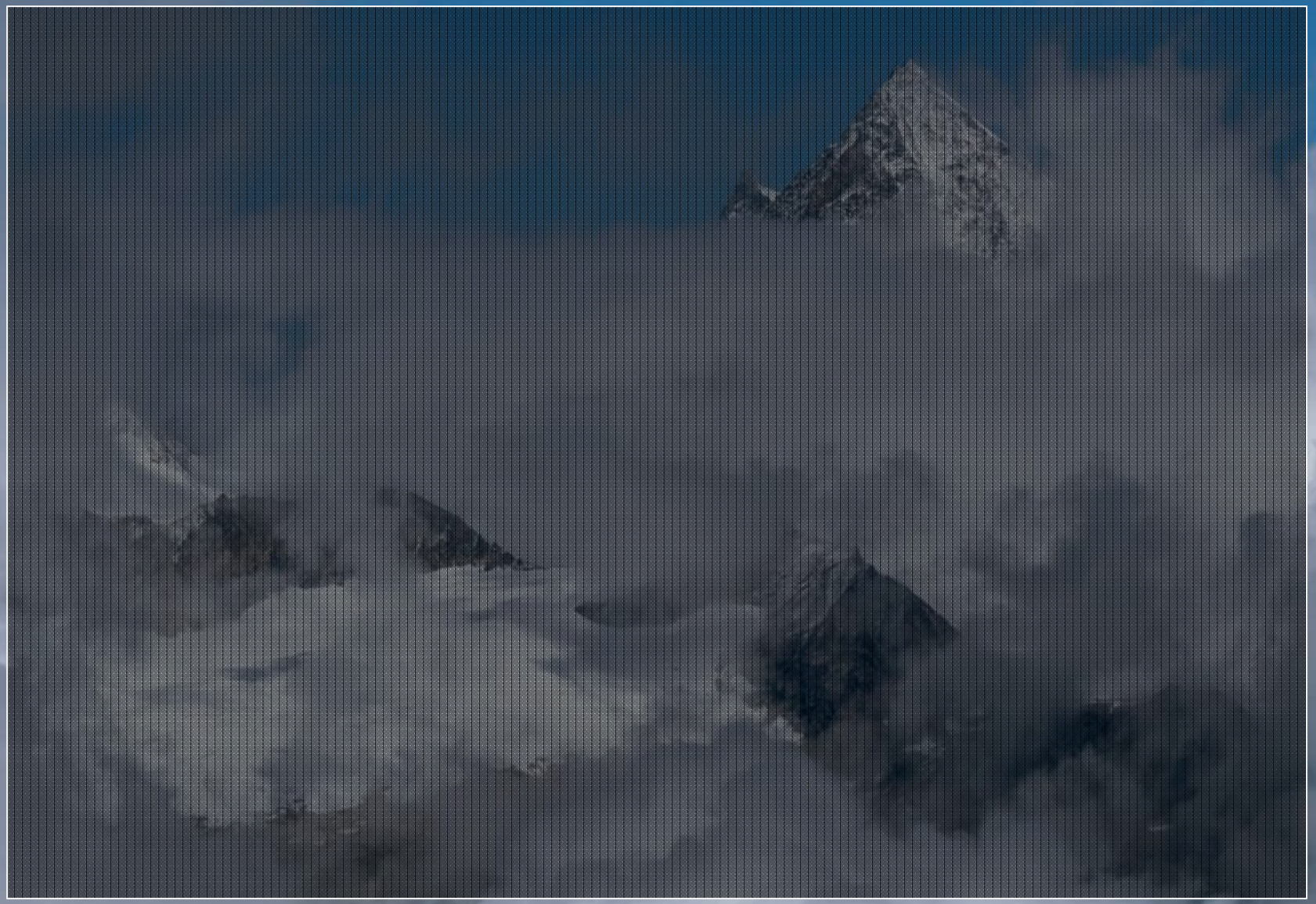
- They're all *inverted pendulums*

The Fundamental Skill of Skiing



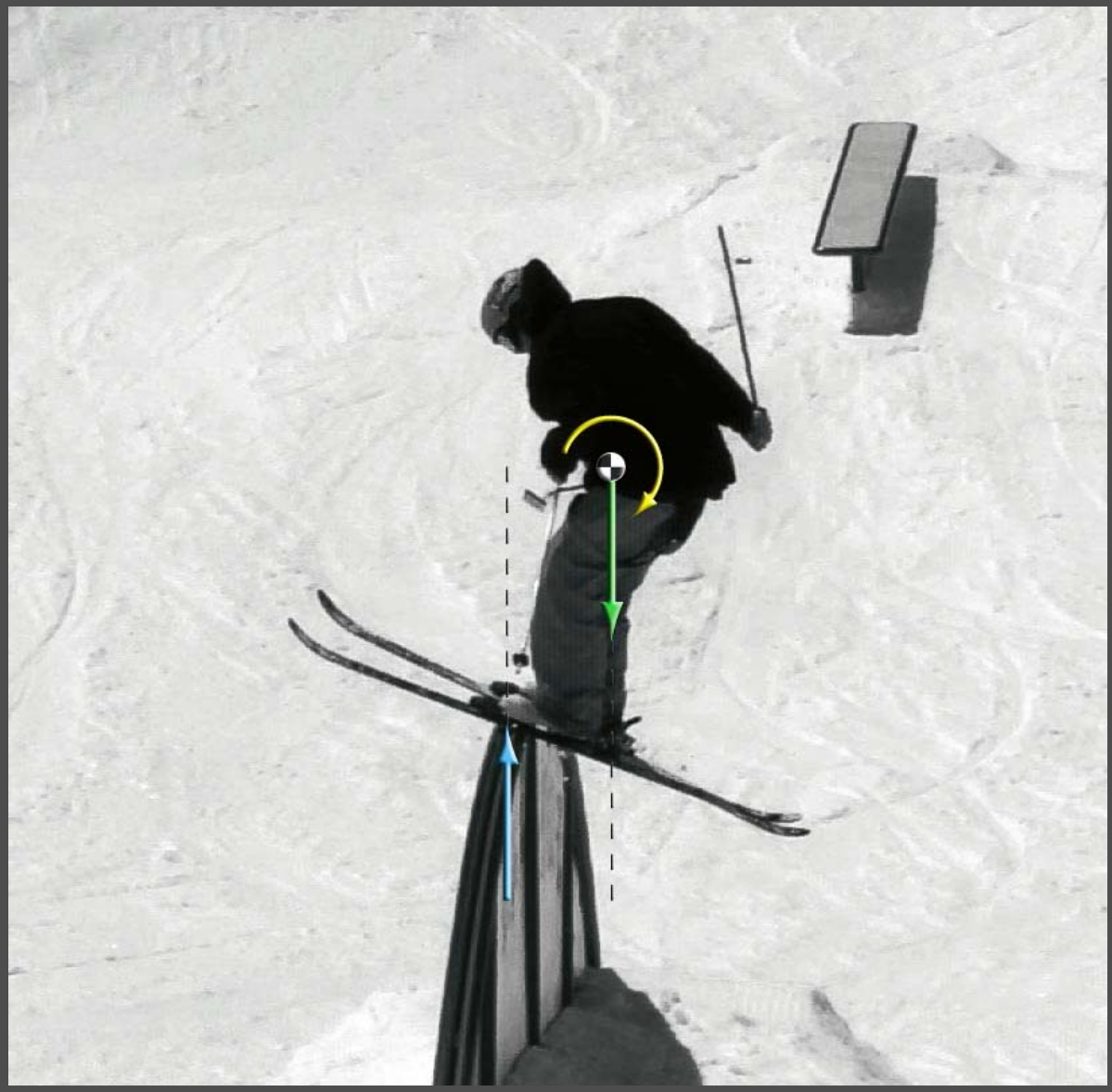
- ***Balancing*** on a moving platform, while that movement changes

What is “Balance”?



Force and Pressure

- Closely related
- Pressure is force spread over a surface
- If the size of the surface is constant
  - High force = high pressure
  - Low force = low pressure
- People have a better intuitive sense of pressure than of force



LATERAL BALANCE: Managing the Transition

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Linking Turns

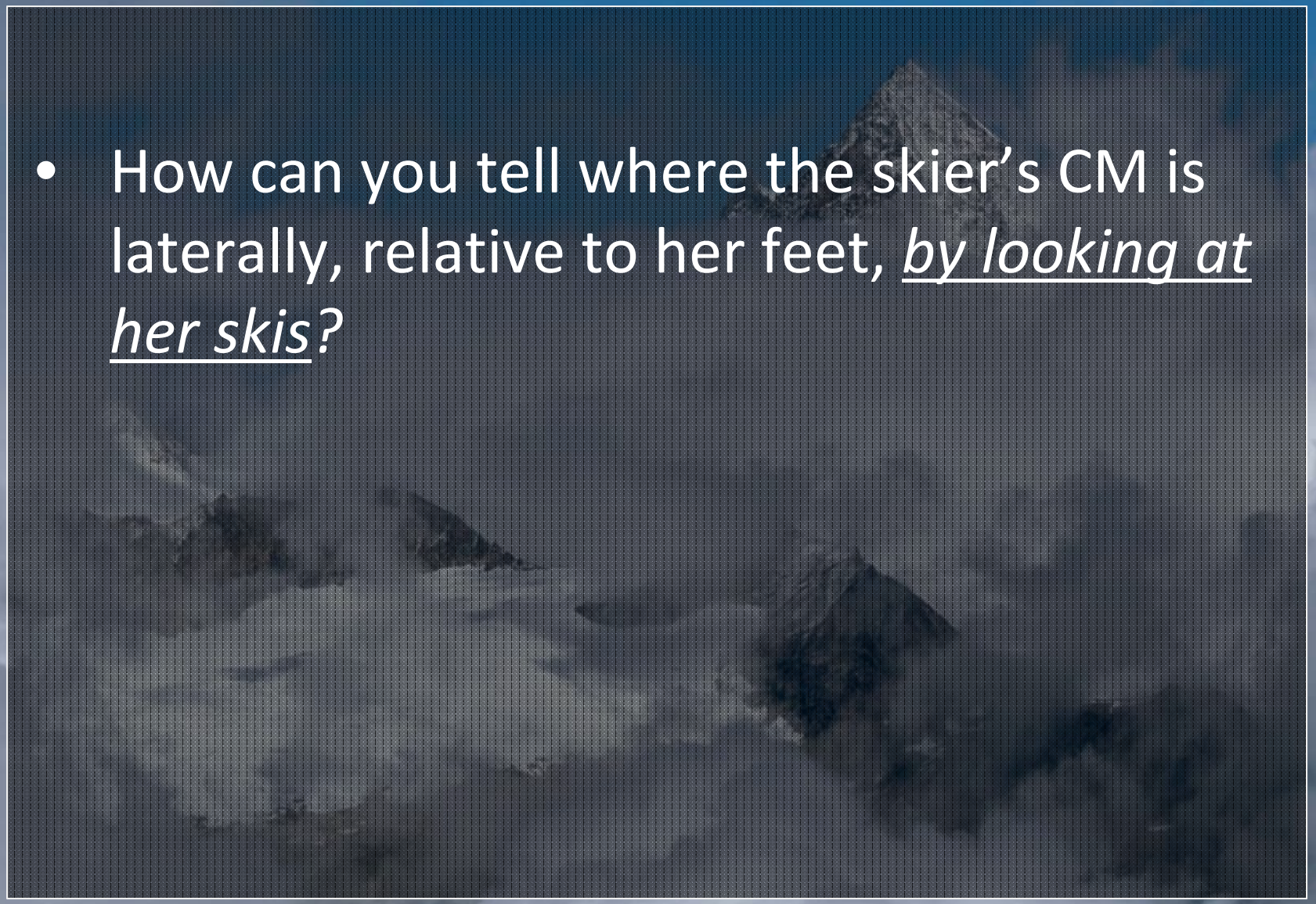
- The skier's CM and point of support must switch sides with each other

Establishing Inclination

- The skier must be inclined relative to the outside ski before there is lateral force
- How skiers do this is a primary differentiator of their skill levels

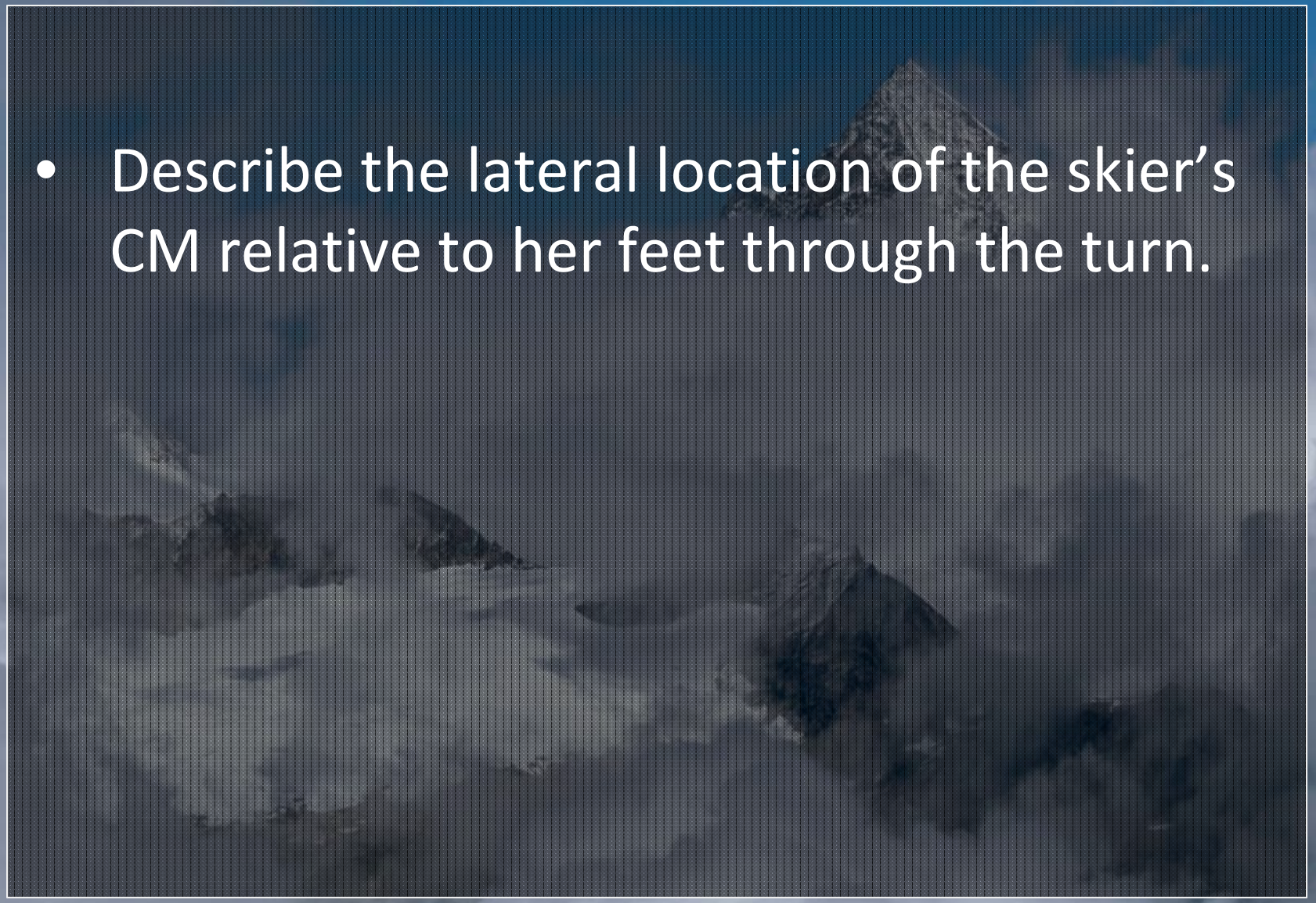
Question

- How can you tell where the skier's CM is laterally, relative to her feet, *by looking at her skis*?



Question

- Describe the lateral location of the skier's CM relative to her feet through the turn.



Question

- Why does the lateral location of the skier's CM relative to the inside foot change in the middle of the turn?
- What sort of terrain makes a wedge christie easier or harder?

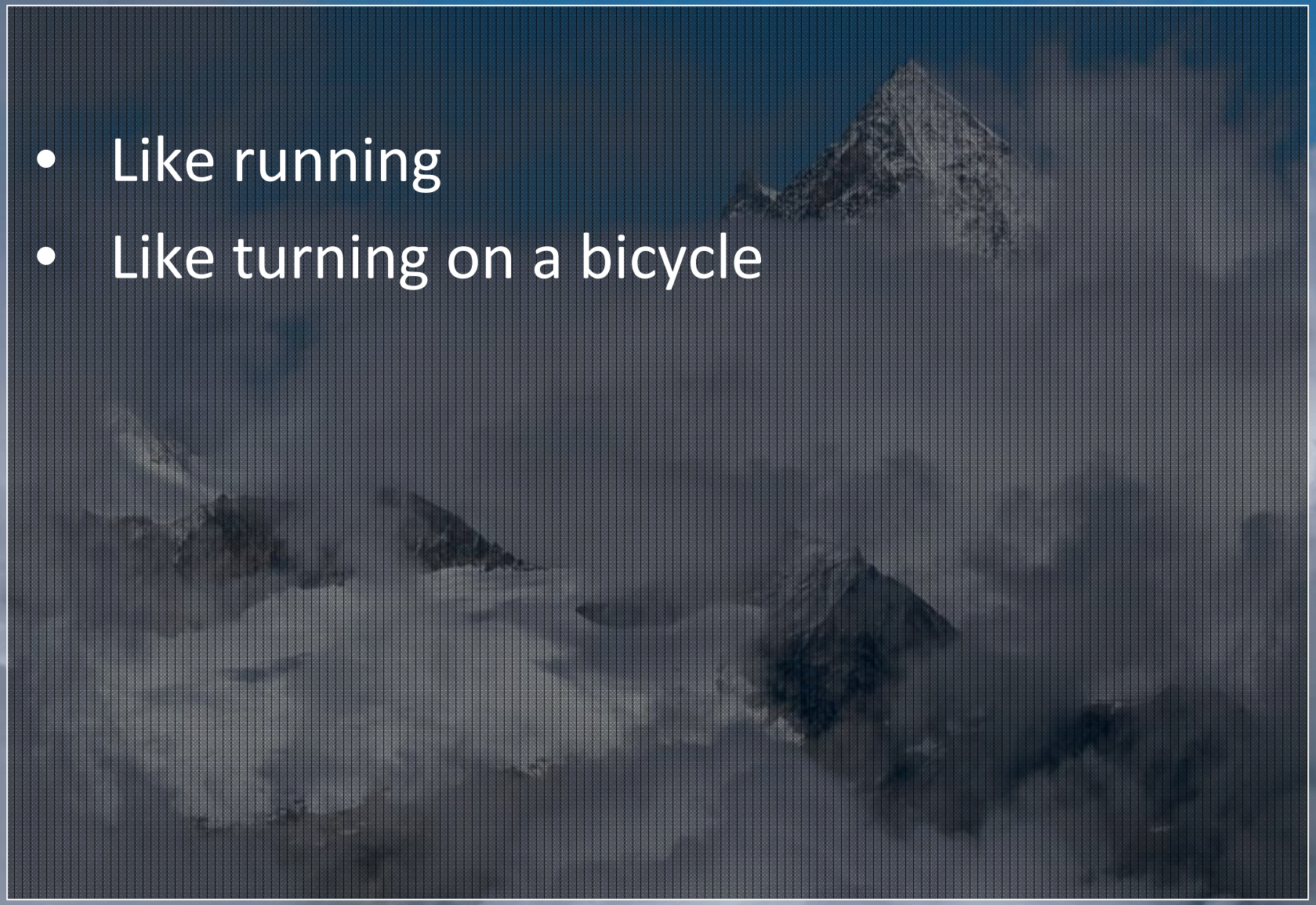
The Key Skill of Intermediate Skiing

- Balancing in a turn with the center of mass to the inside of both feet
- This is analogous to walking

The Key Skill of Advanced Skiing

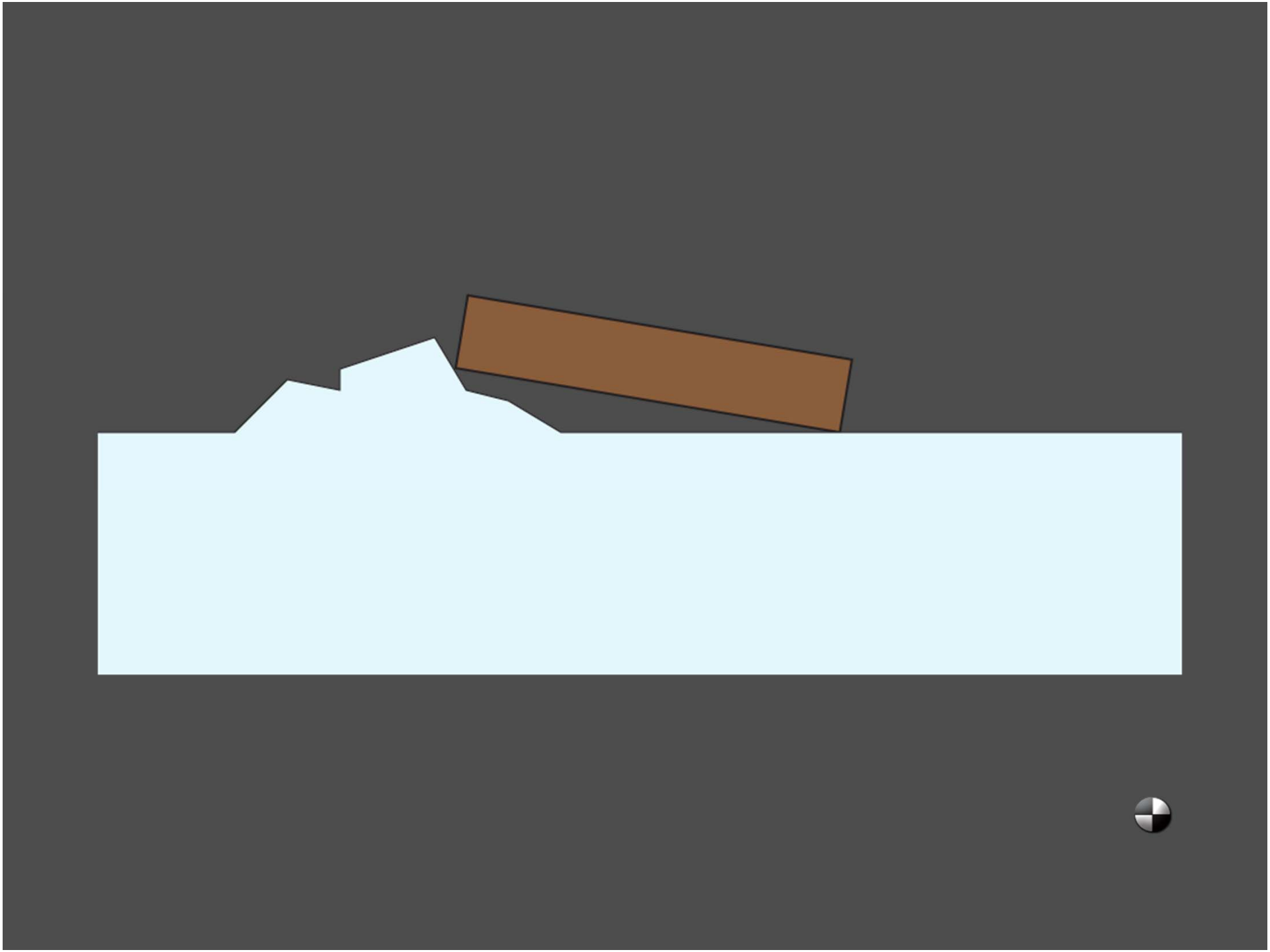
- Entering a turn in a relatively narrow stance (hip width or closer)

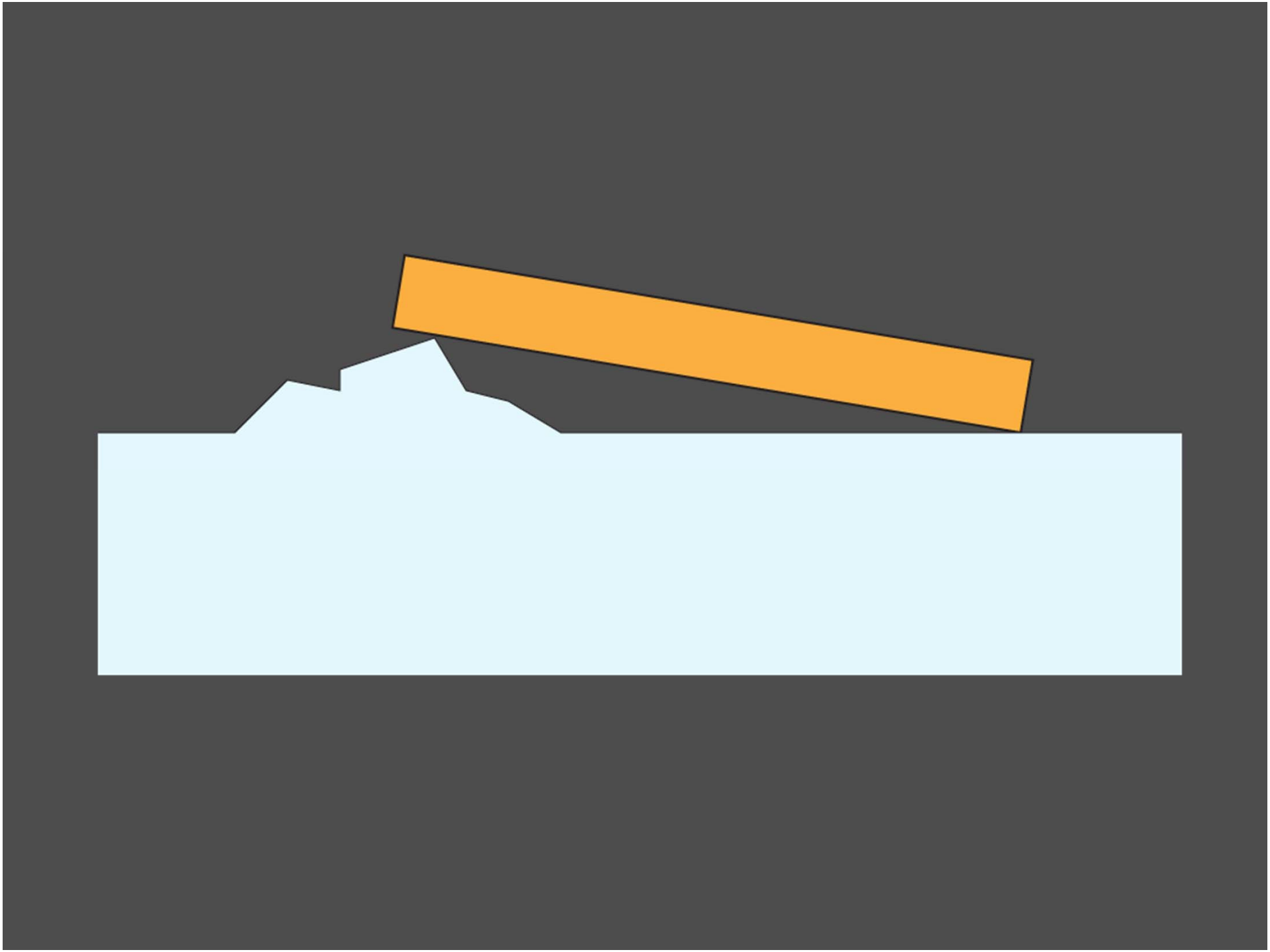
Starting a Turn in a Narrow Stance



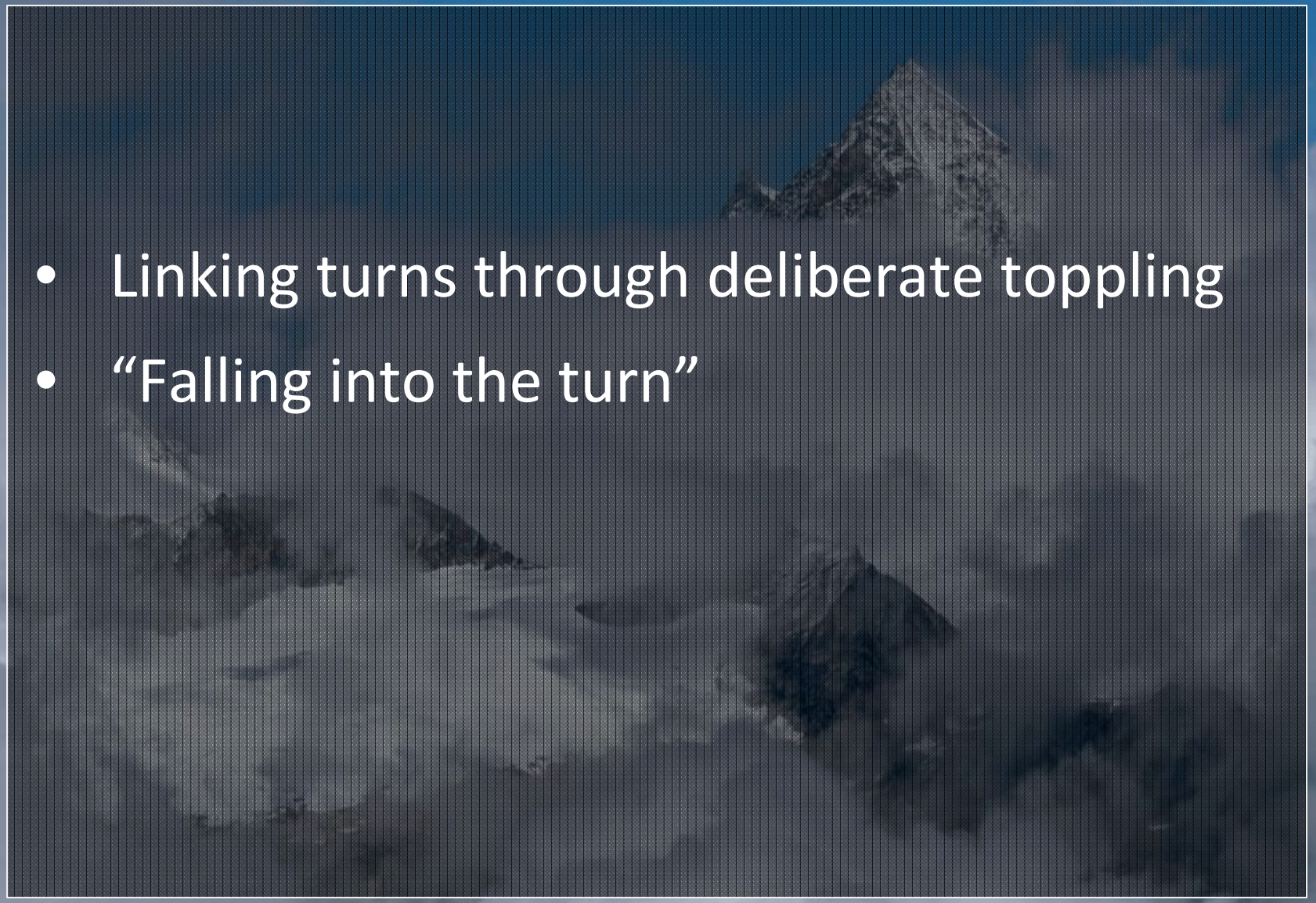
- Like running
- Like turning on a bicycle


HORIZON
HORIZON





The Key Skill in Advanced Skiing



- Linking turns through deliberate toppling
- "Falling into the turn"

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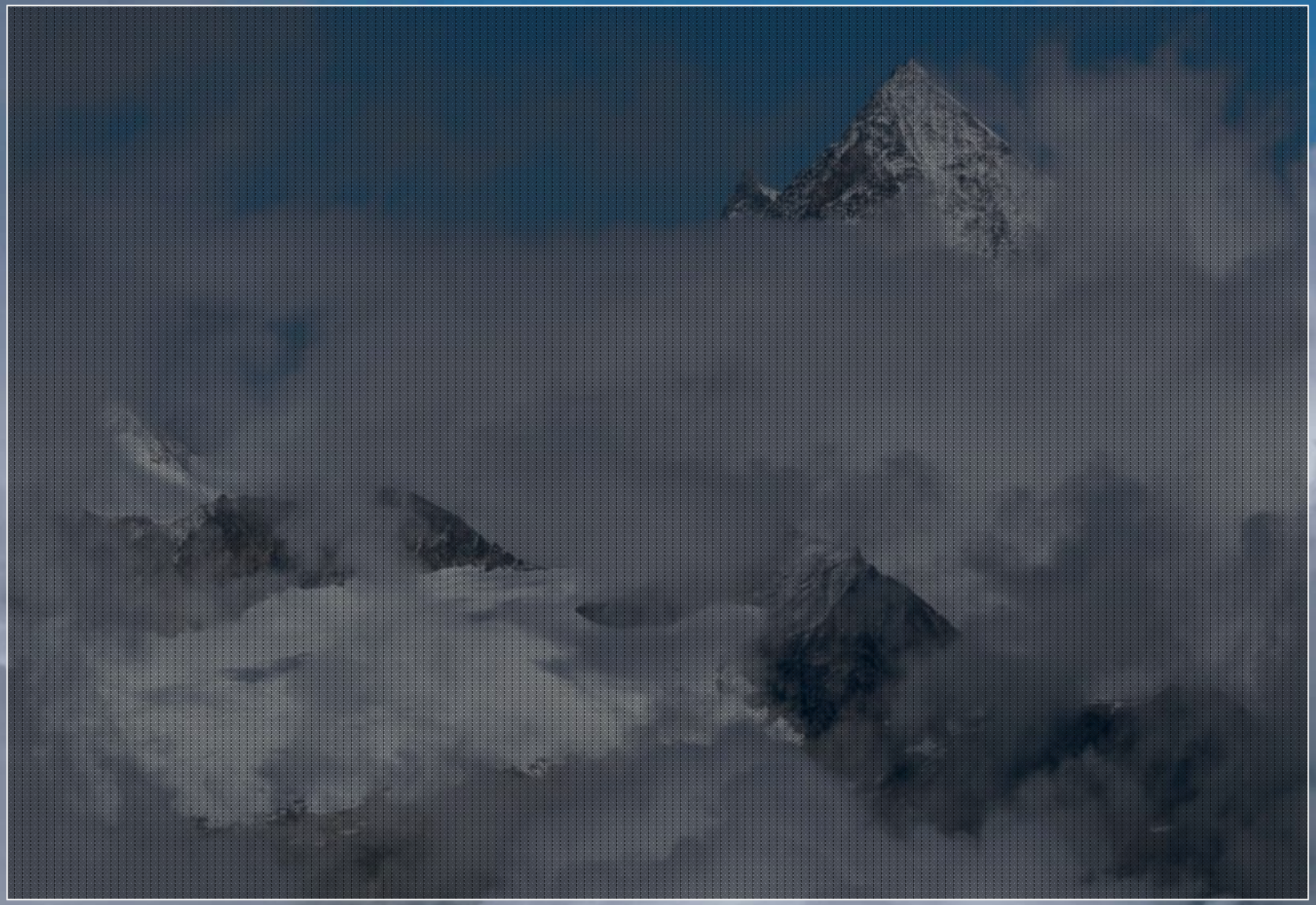
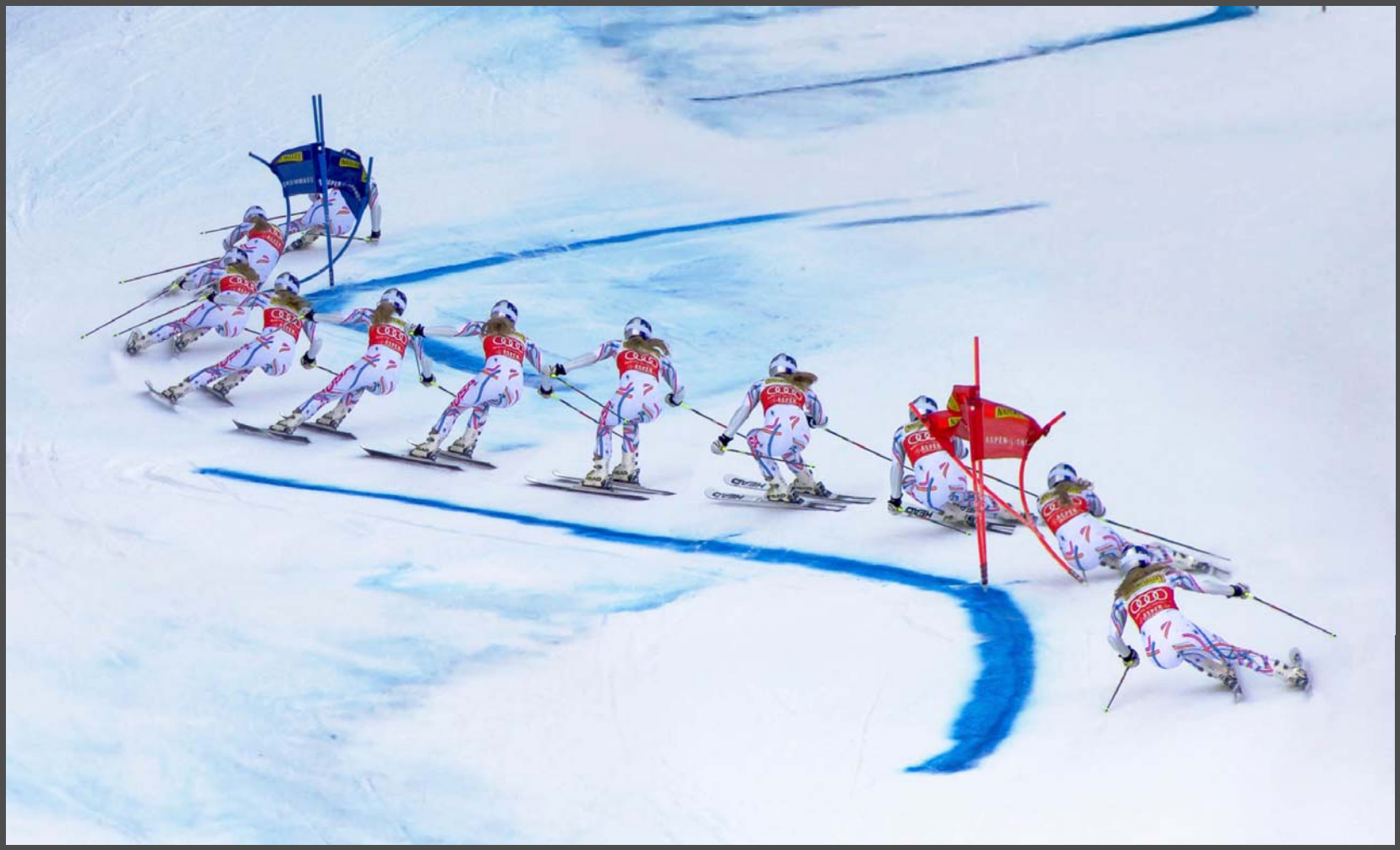
Controlled Toppling

- Developing judgment is crucial
- Beginning parallel skiers pivot quickly at turn initiation to shorten the period of imbalance
- Expert skiers enjoy it

The Estimation Problem

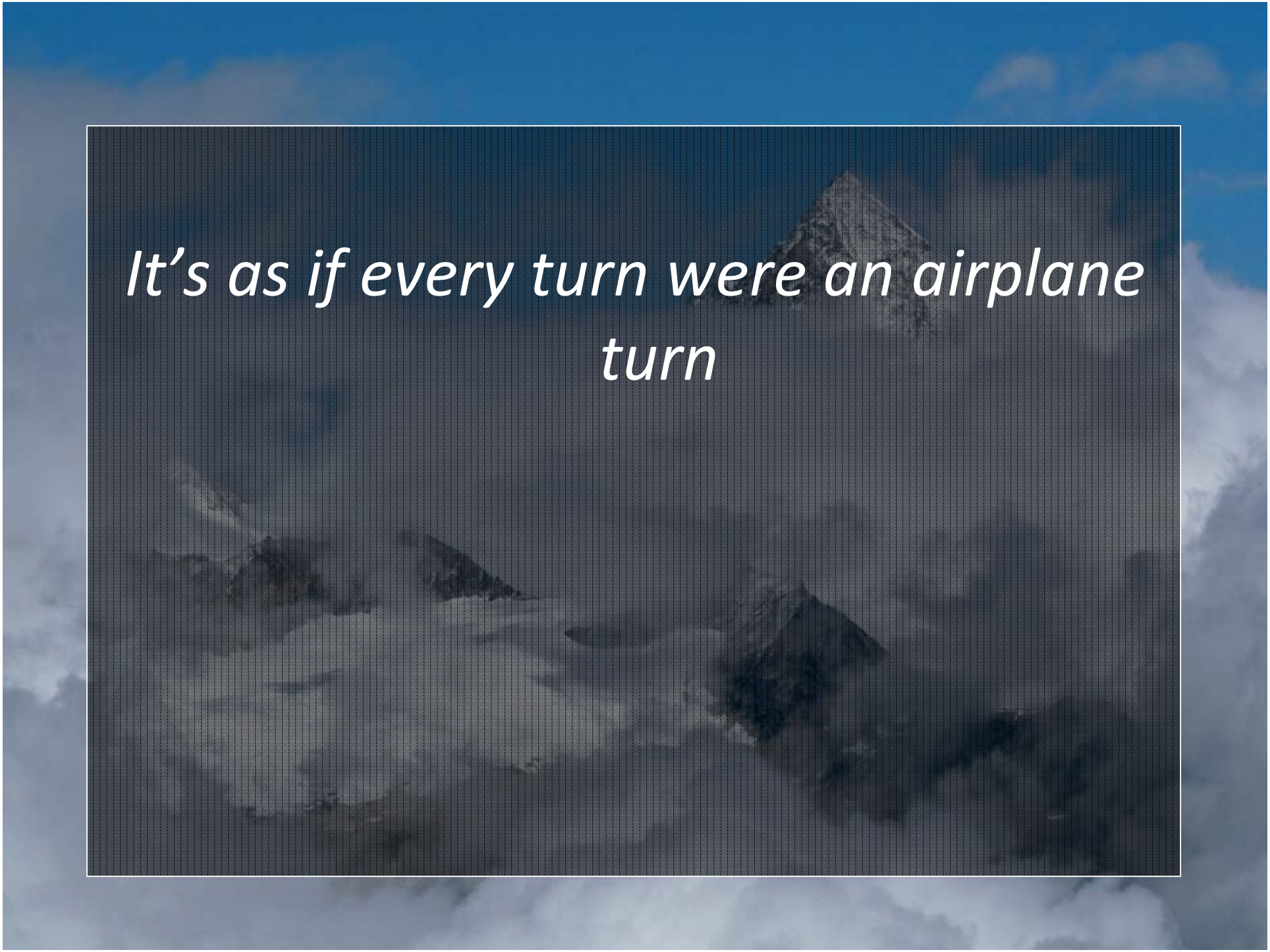




The Estimation Problem

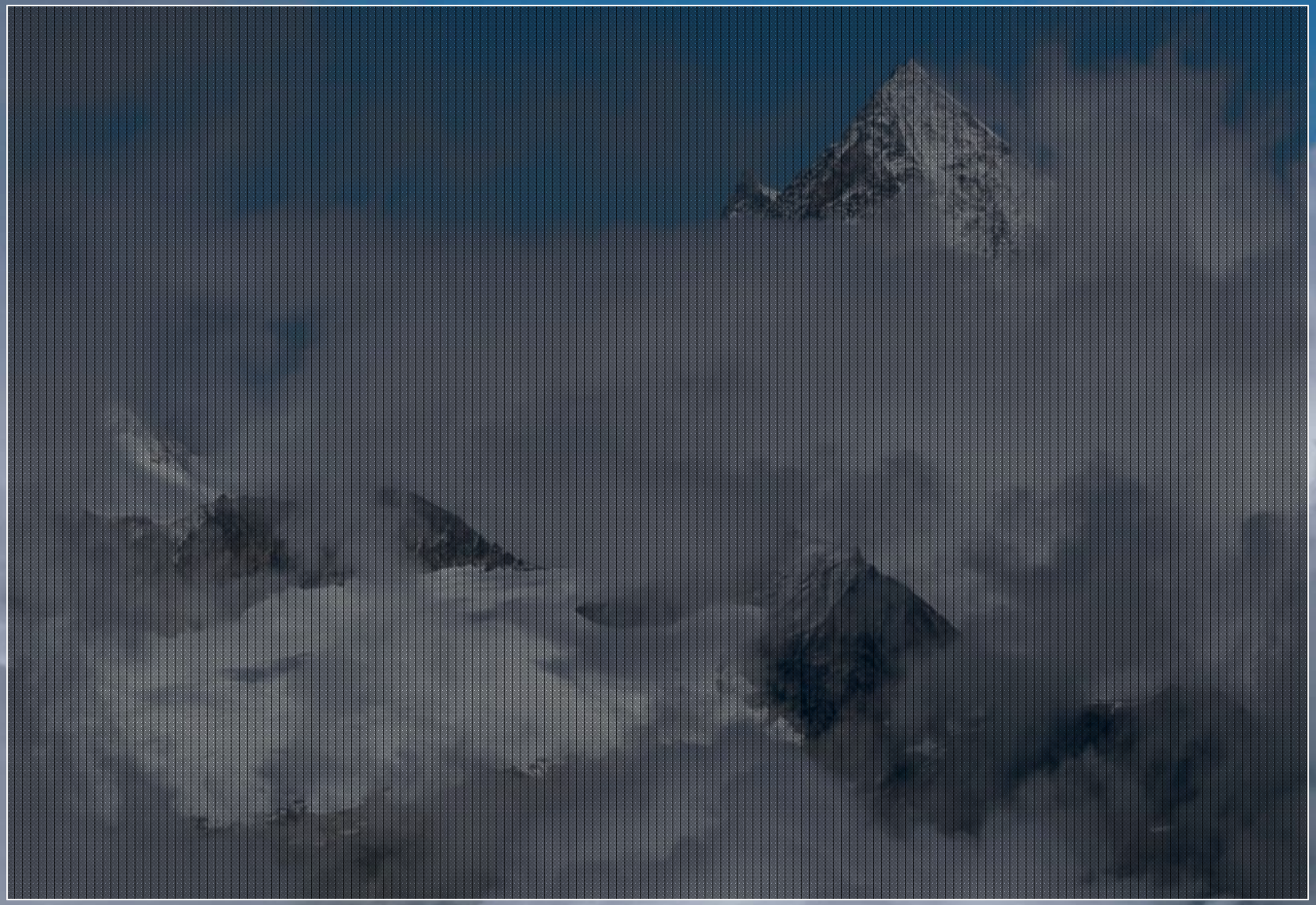
- Before you begin the transition, you must estimate
  - ✓ Where exactly it will end
  - ✓ How much grip you will get from the snow
  - ✓ How much you need to redirect your skis
  - ✓ How much lateral (centrifugal) force you will experience

This dictates how fast and in just what direction you must topple

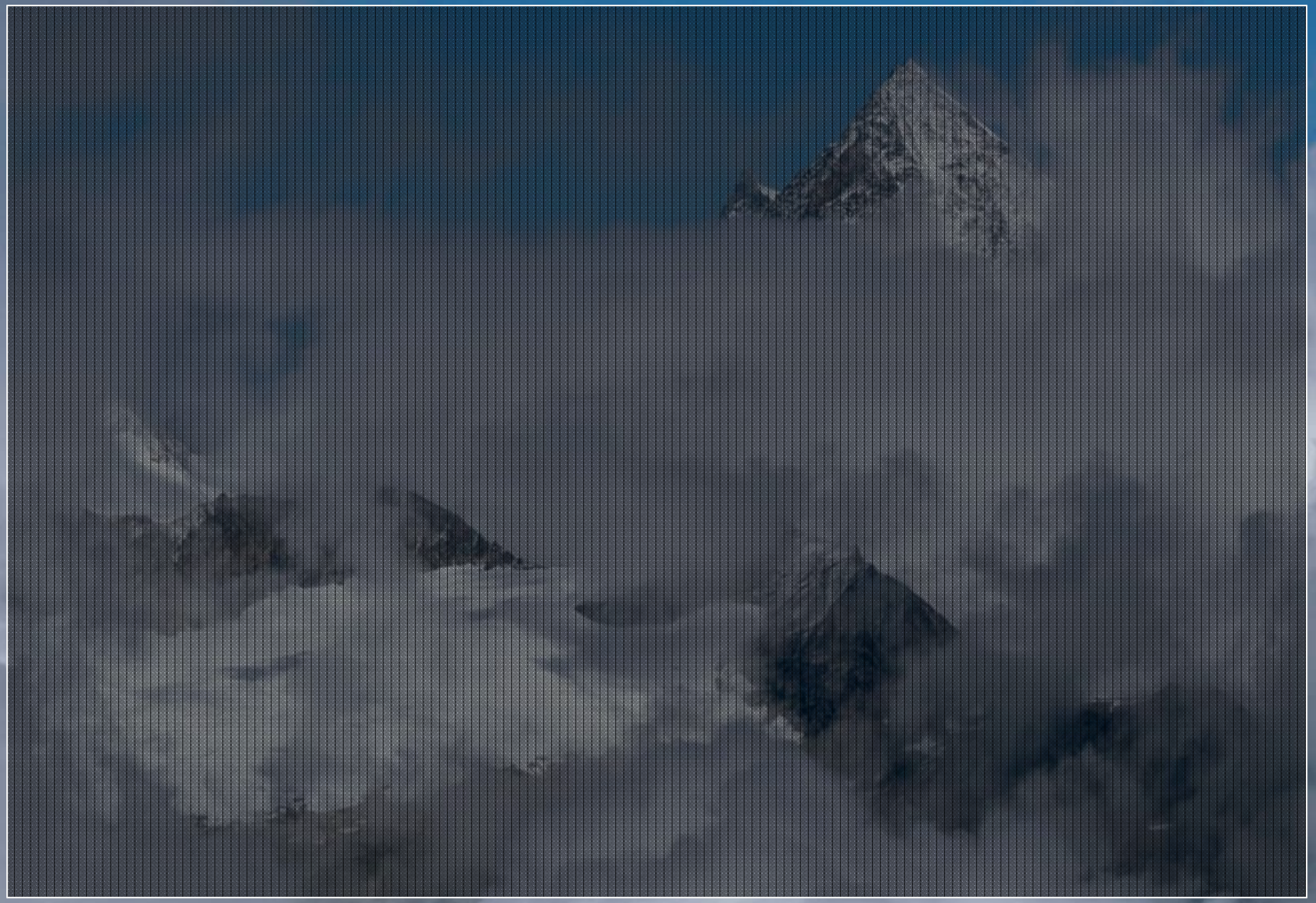

It's as if every turn were an airplane turn

- As speeds and lateral forces increase, things get harder because you're moving between positions of greater inclination
- As hill gets steeper it gets harder because it's a longer time before you get some force

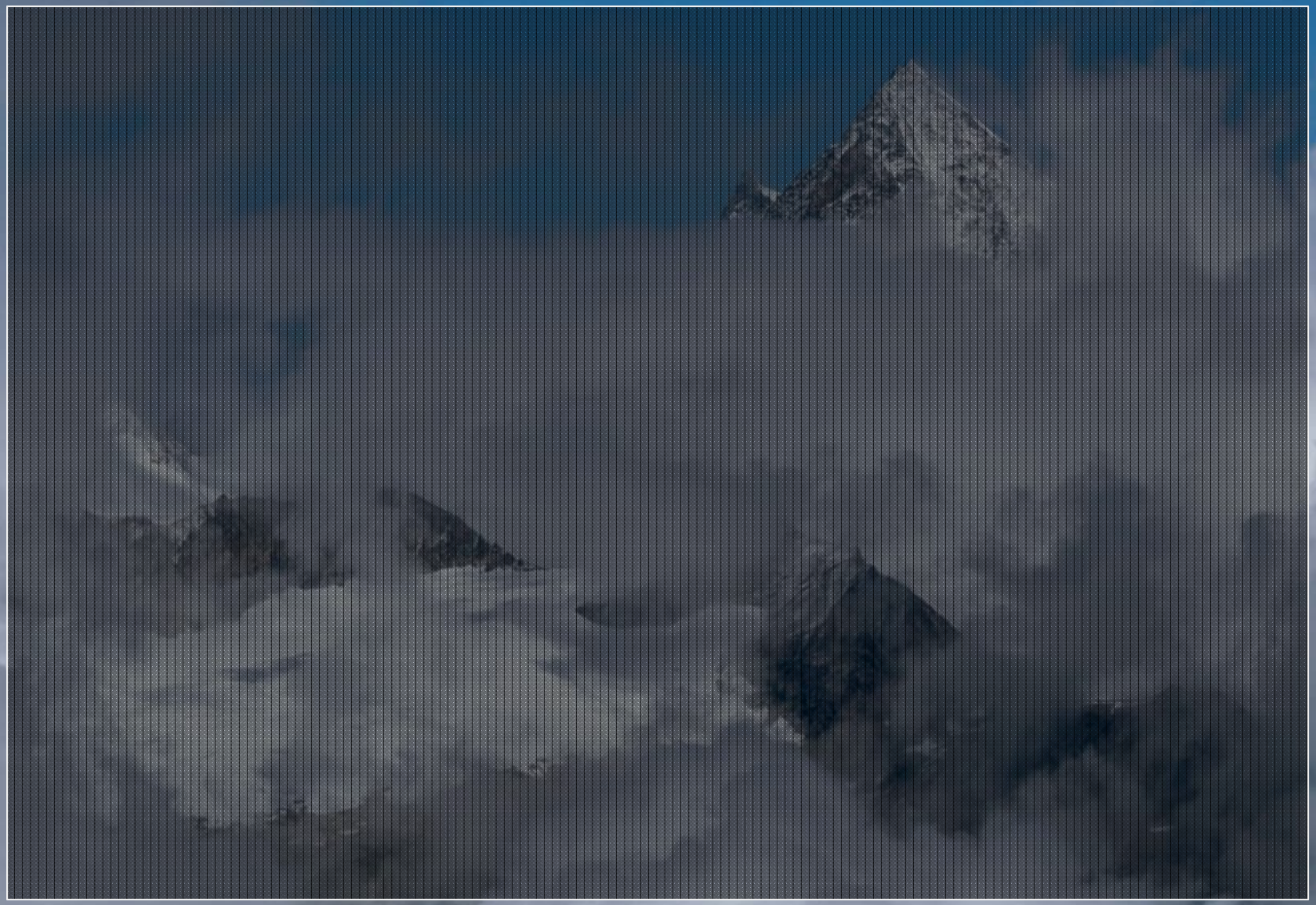
Techniques for Toppling



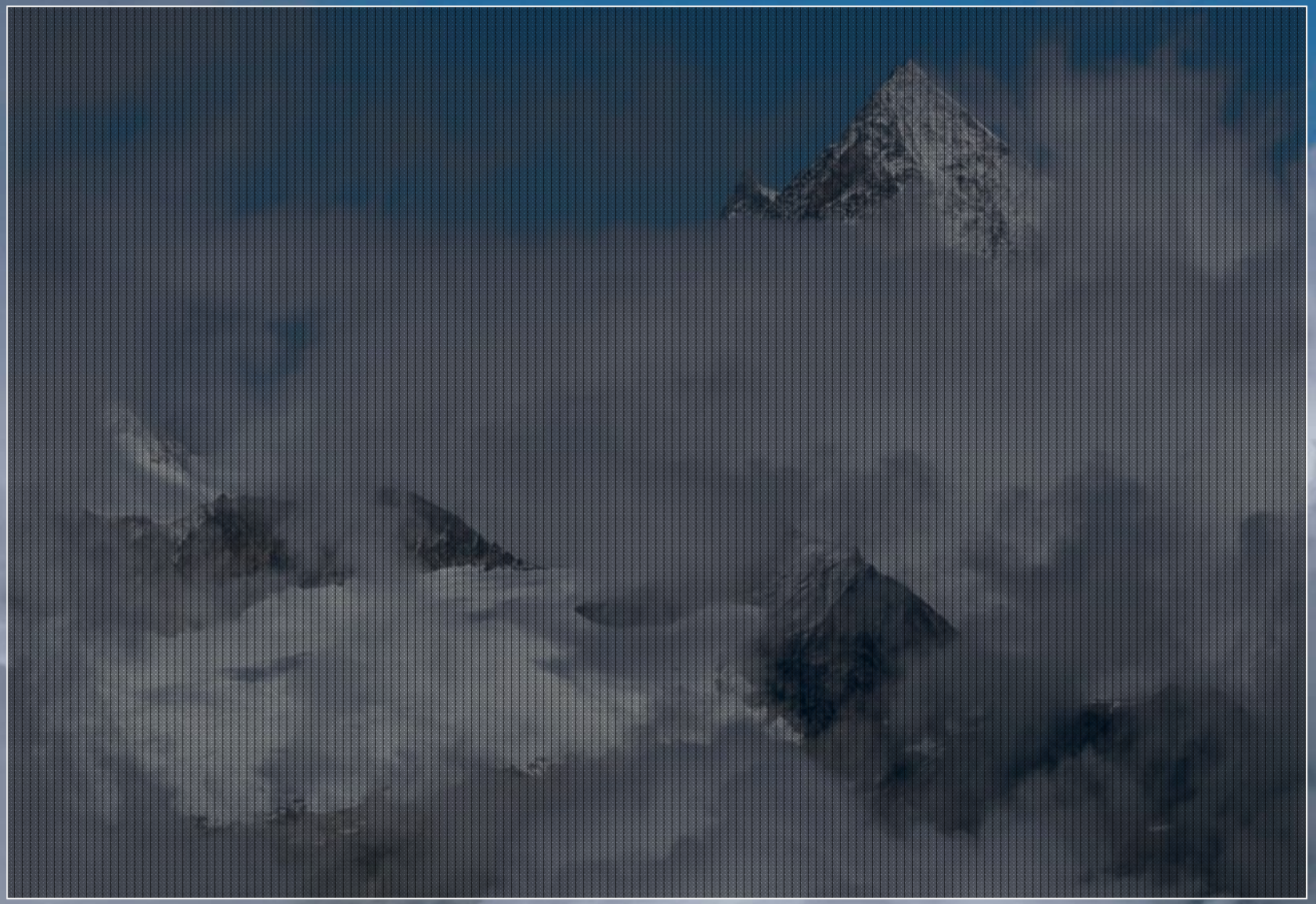
Make the Feet Slow Down



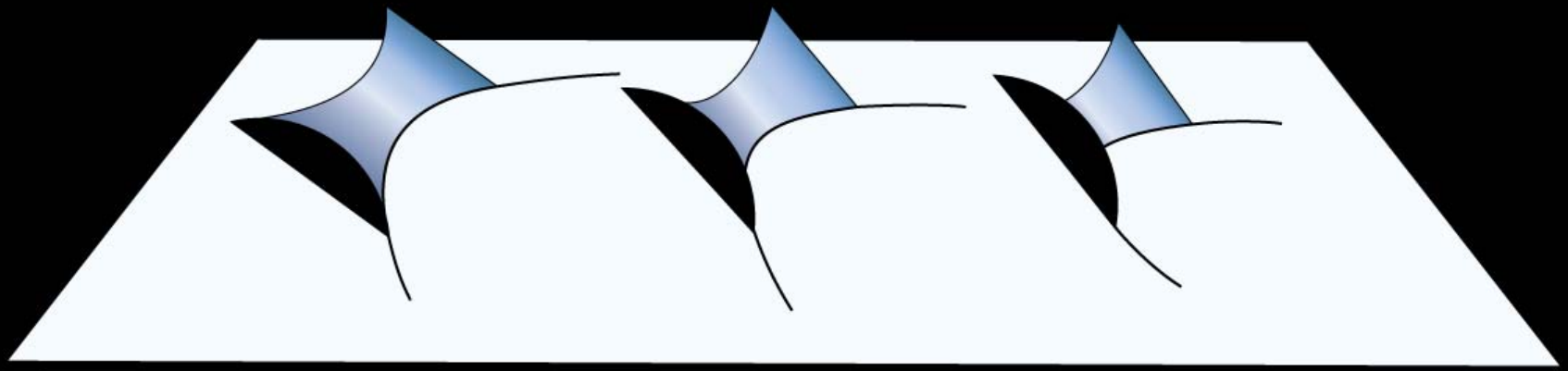
Skills Quest Drills?



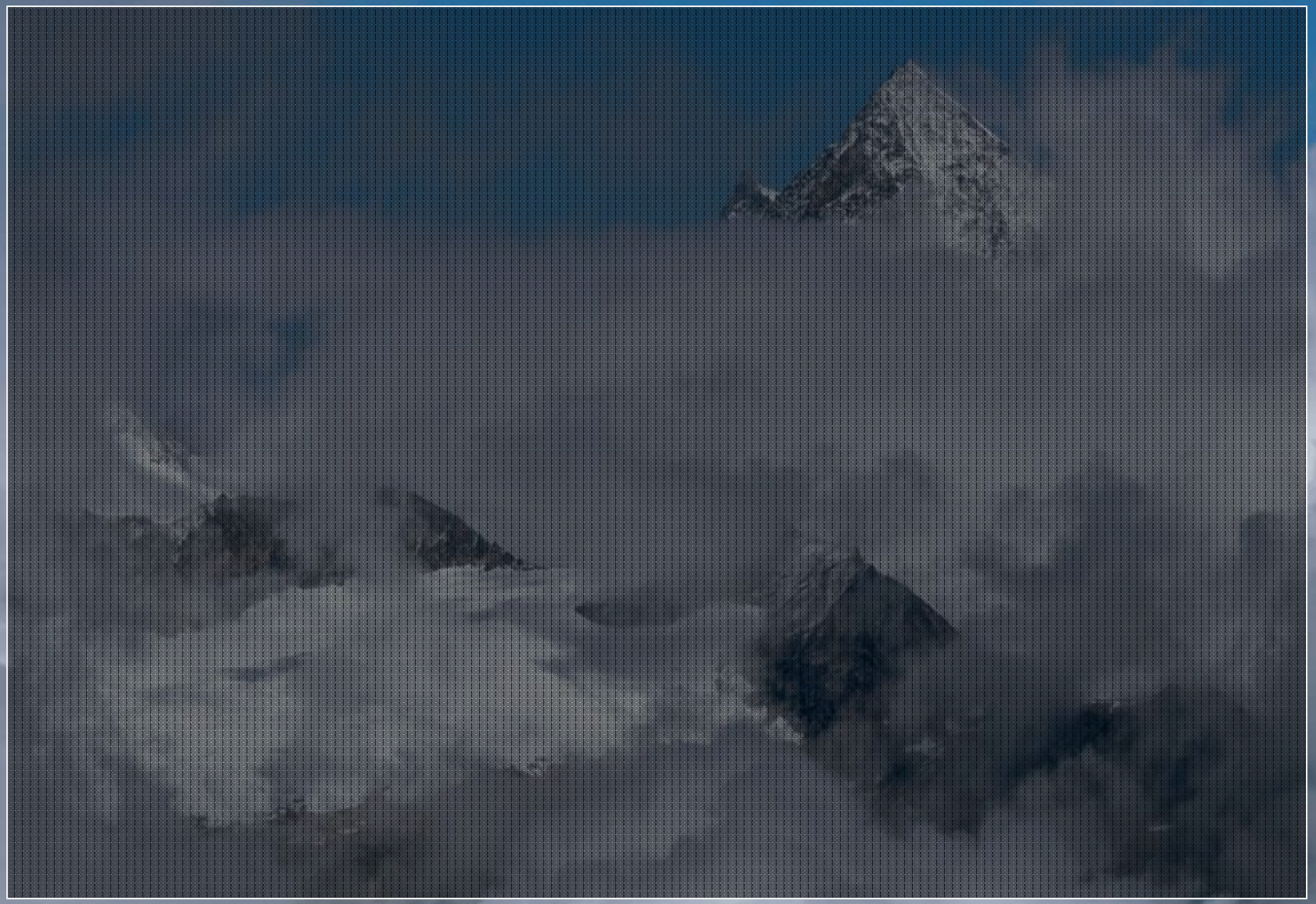
Make the Feet Turn More Sharply



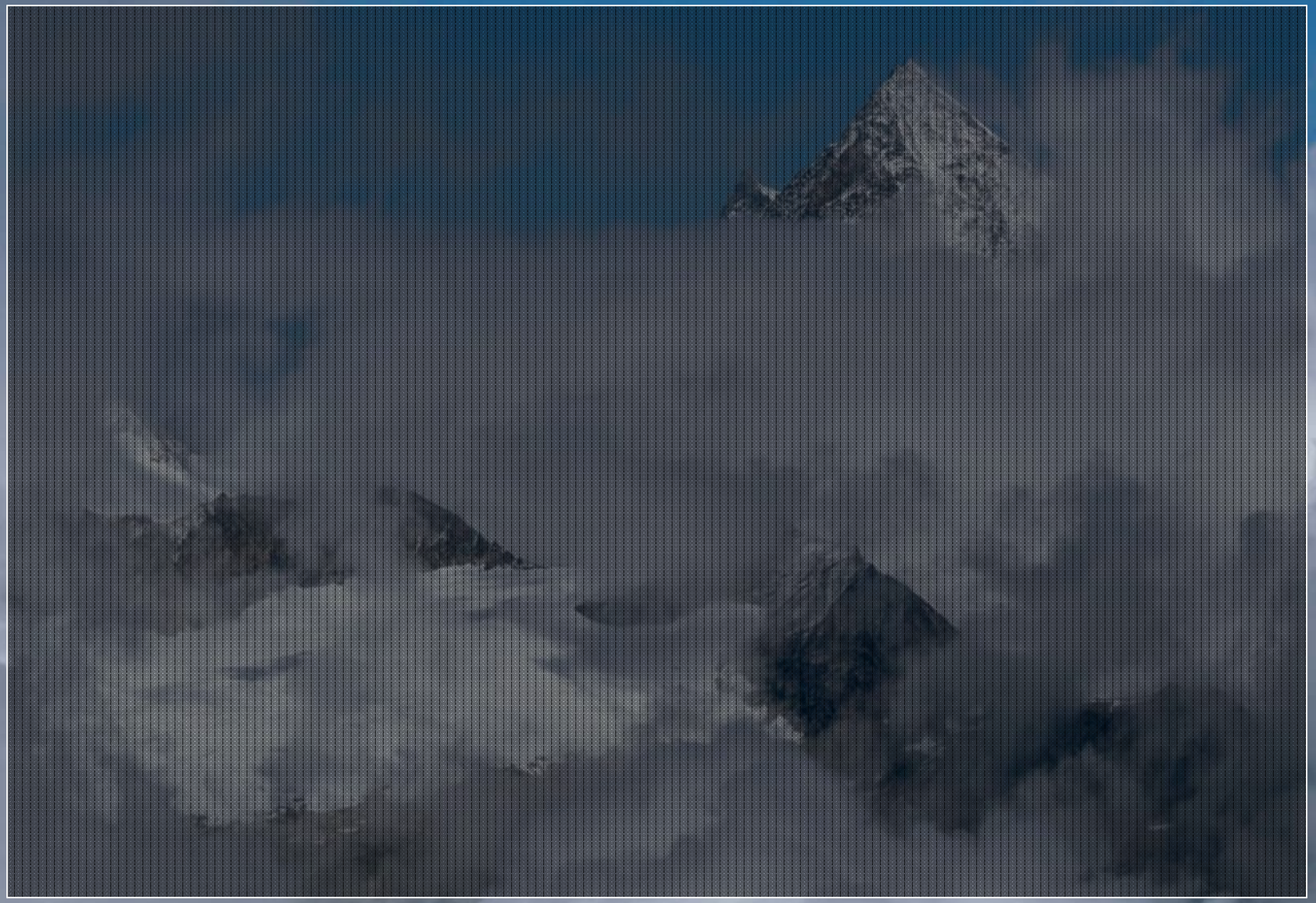
Edge Angle and Turning Radius



Make the Upper Body Go Straighter

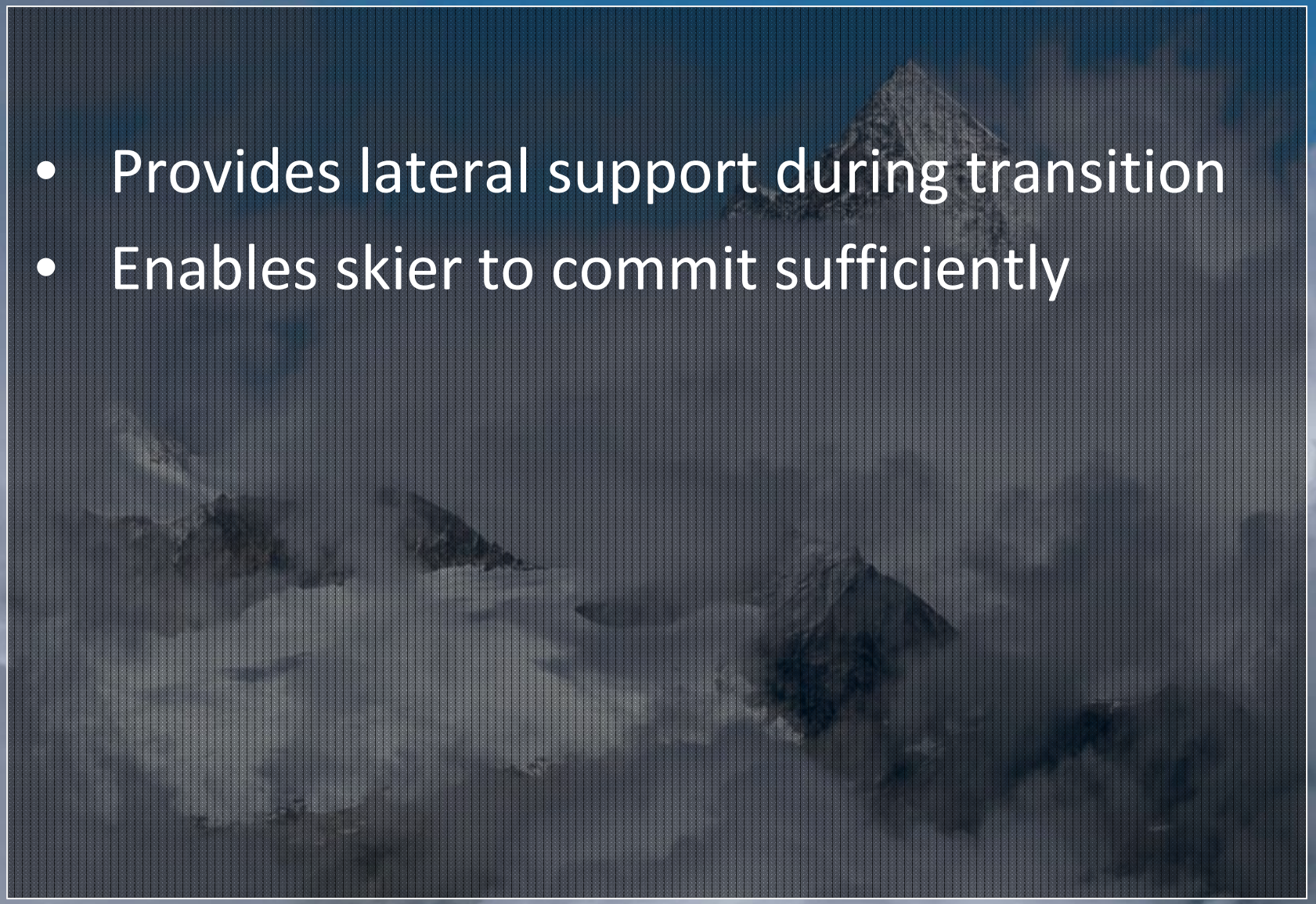


Pole Plant



Pole Plant

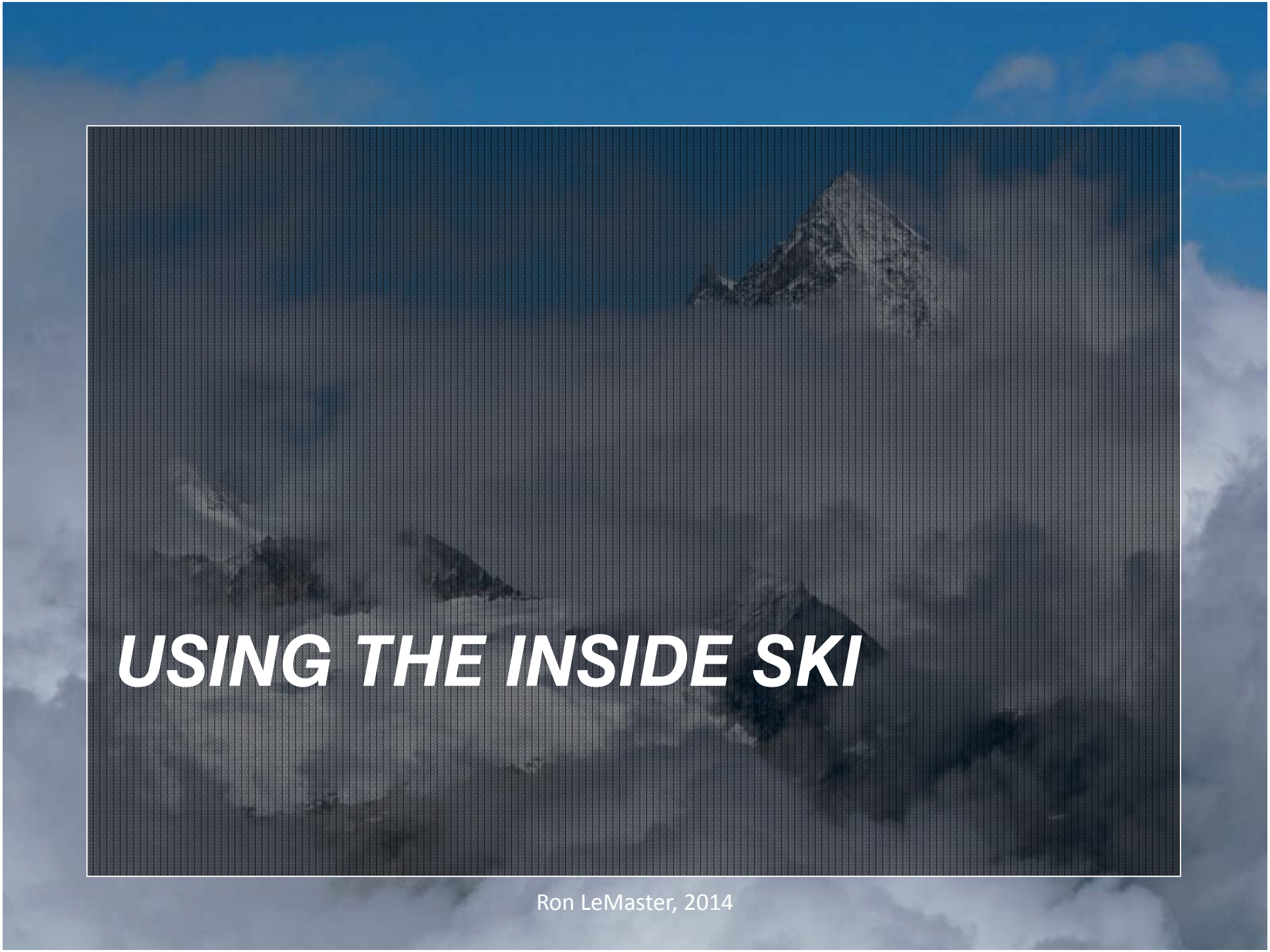
- Provides lateral support during transition
- Enables skier to commit sufficiently



Knowing when and how to go out of balance in a controlled way

Estimating the parameters of the transition well

Ultimately, it's the mountain that teaches you how to ski



USING THE INSIDE SKI

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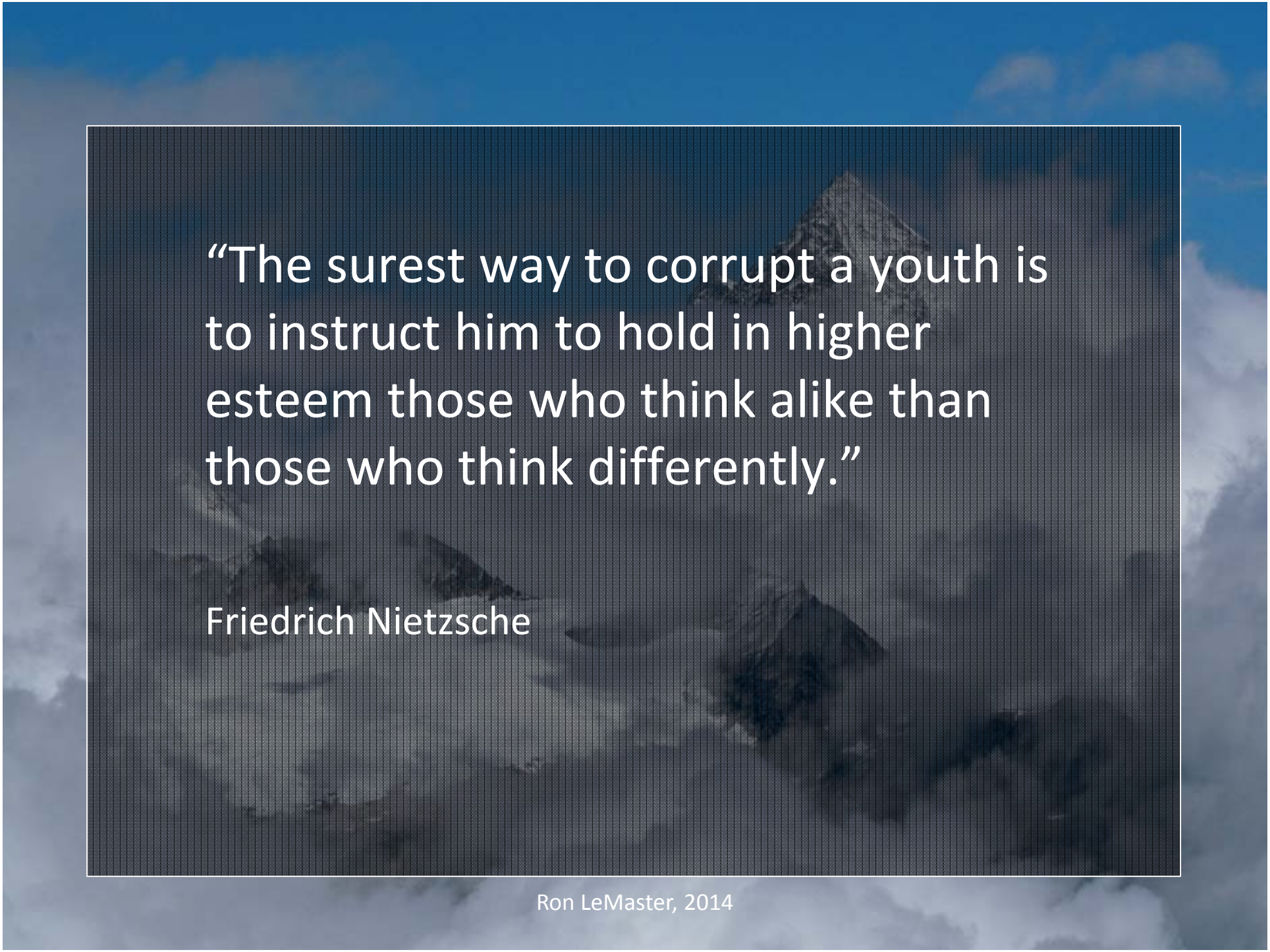
“The surest way to corrupt a youth is to instruct him to hold in higher esteem those who think alike than those who think differently.”
Friedrich Nietzsche

What Is Going On Here?

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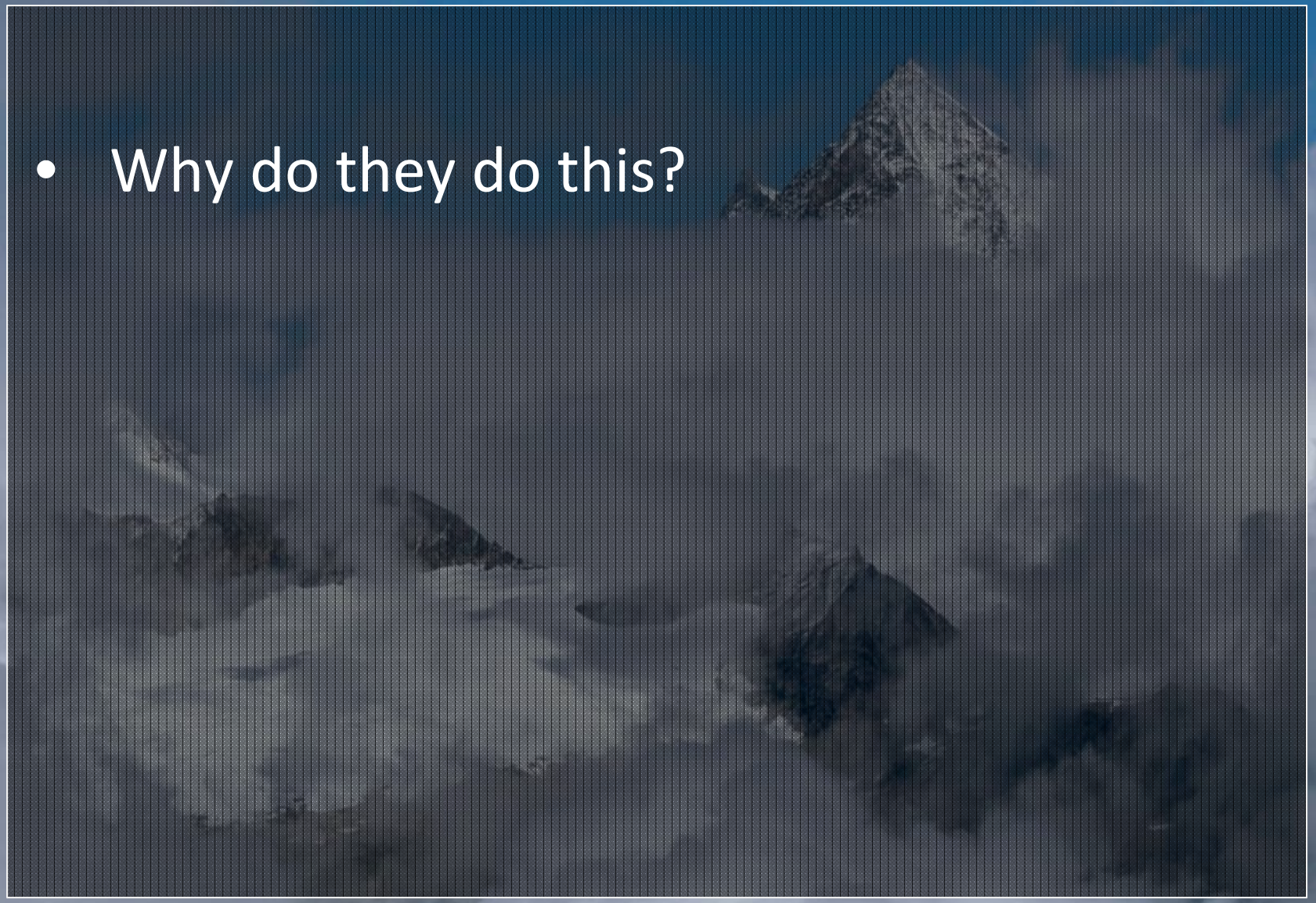
Question



- Why do they do this?

Why?

- What is important to a competitive skier?
  - How does he or she accomplish that?
    - How does he or she accomplish that?
      - How does he or she accomplish that?
        - How does he or she accomplish that?
          - How does he or she accomplish that?

- At each level of the chain, ask:

"How could what I see help the skier accomplish that purpose?"

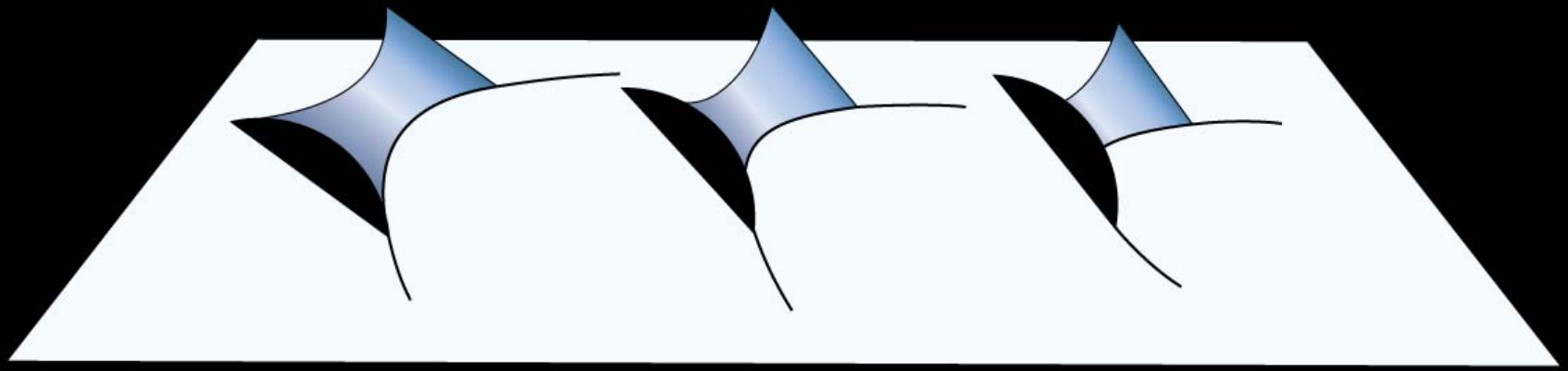
Why

- Skier wants to get from top to bottom as quickly as possible
- How? Ski as short a line as possible, as cleanly as possible, in most turns.
- How? Carve the smallest-radius turn possible

Why

- How: Make the outside ski hold and bend as deeply as possible
- How: Get the ski at the highest edge angle possible, with pressure, as early in the turn as possible

Edge Angle and Turning Radius



Why

- To make a tight turn you need high edge angle
- But the slope effectively reduces edge angle early in the turn

How?

- How do you get high edge angle early in the turn?

Exercise

- Edge ski boot standing on one foot
- How can you increase the edge angle?

“In-rigger”Turn

"In-rigger" Turn

- Go forward into the turn with most weight on forebody of new ***inside*** ski, slightly edged
- Slide new outside ski farther to the outside, and pull it back a bit

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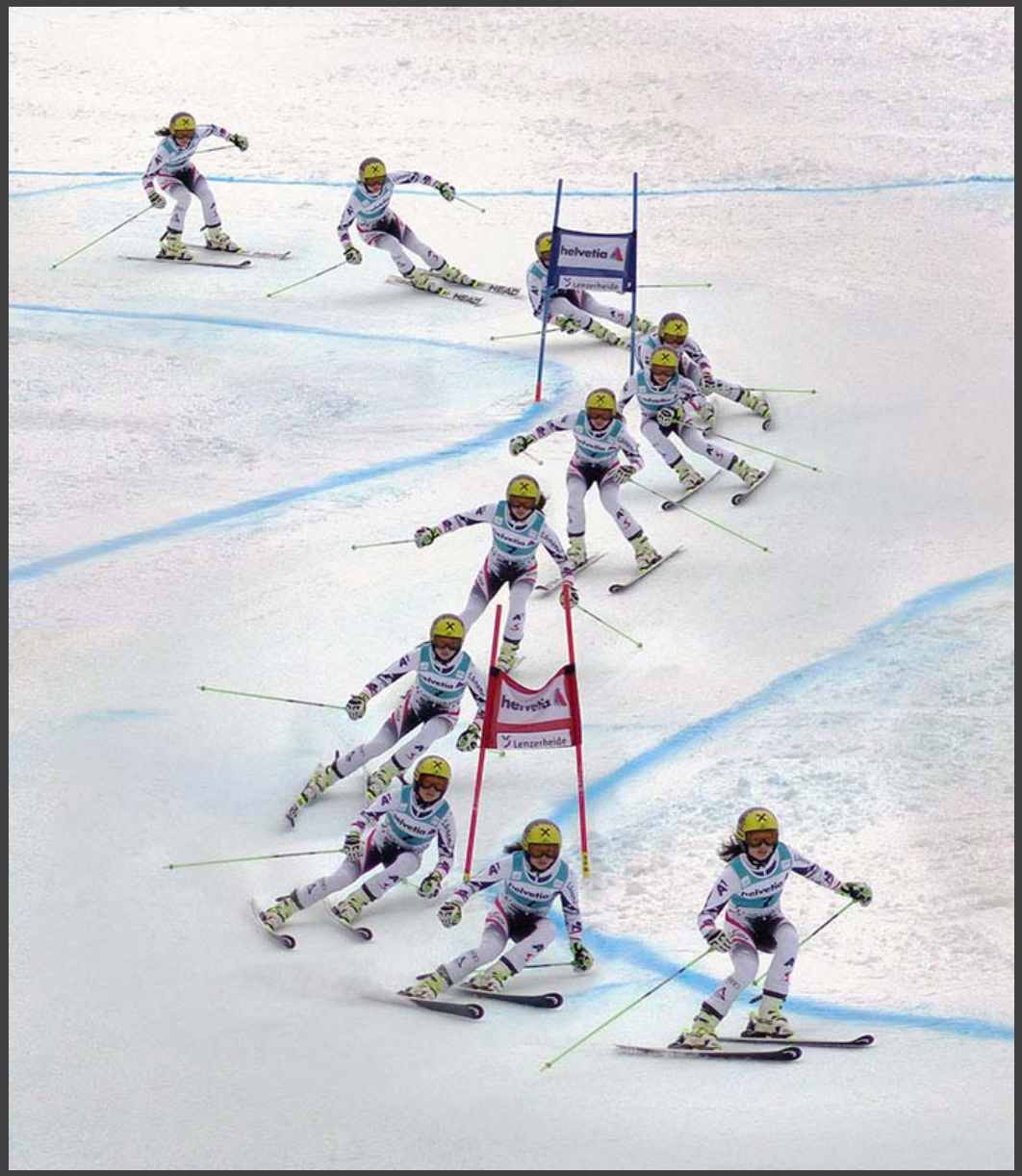

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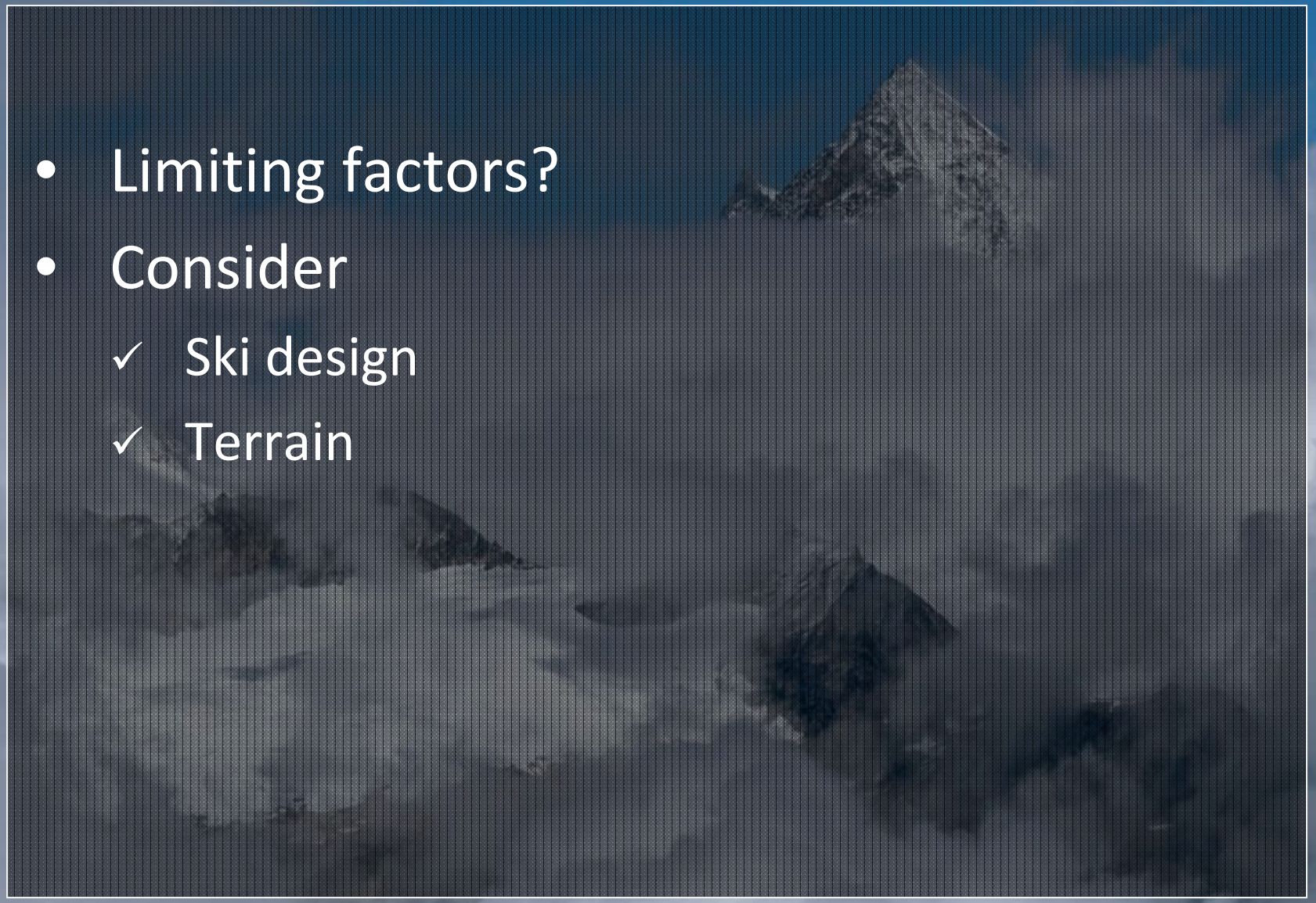
Keys

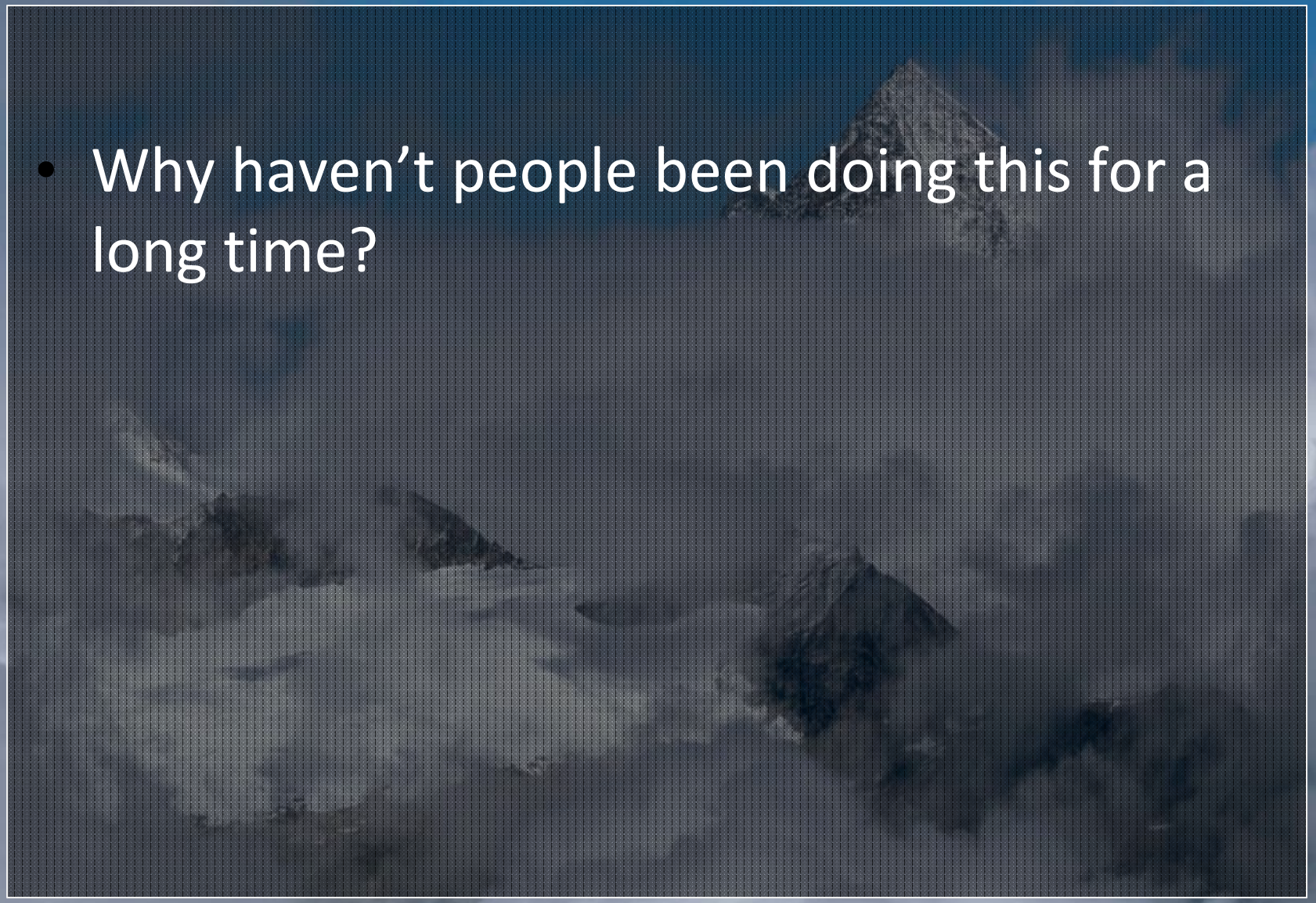
- You *must* be able to make a good turn on your outside ski first!
- You must have enough pressure on the outside ski for it to
  - ✓ Hold
  - ✓ Bend

Practical Limitations



- Limiting factors?
- Consider
  - ✓ Ski design
  - ✓ Terrain

Question



- Why haven't people been doing this for a long time?

Thank You!

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